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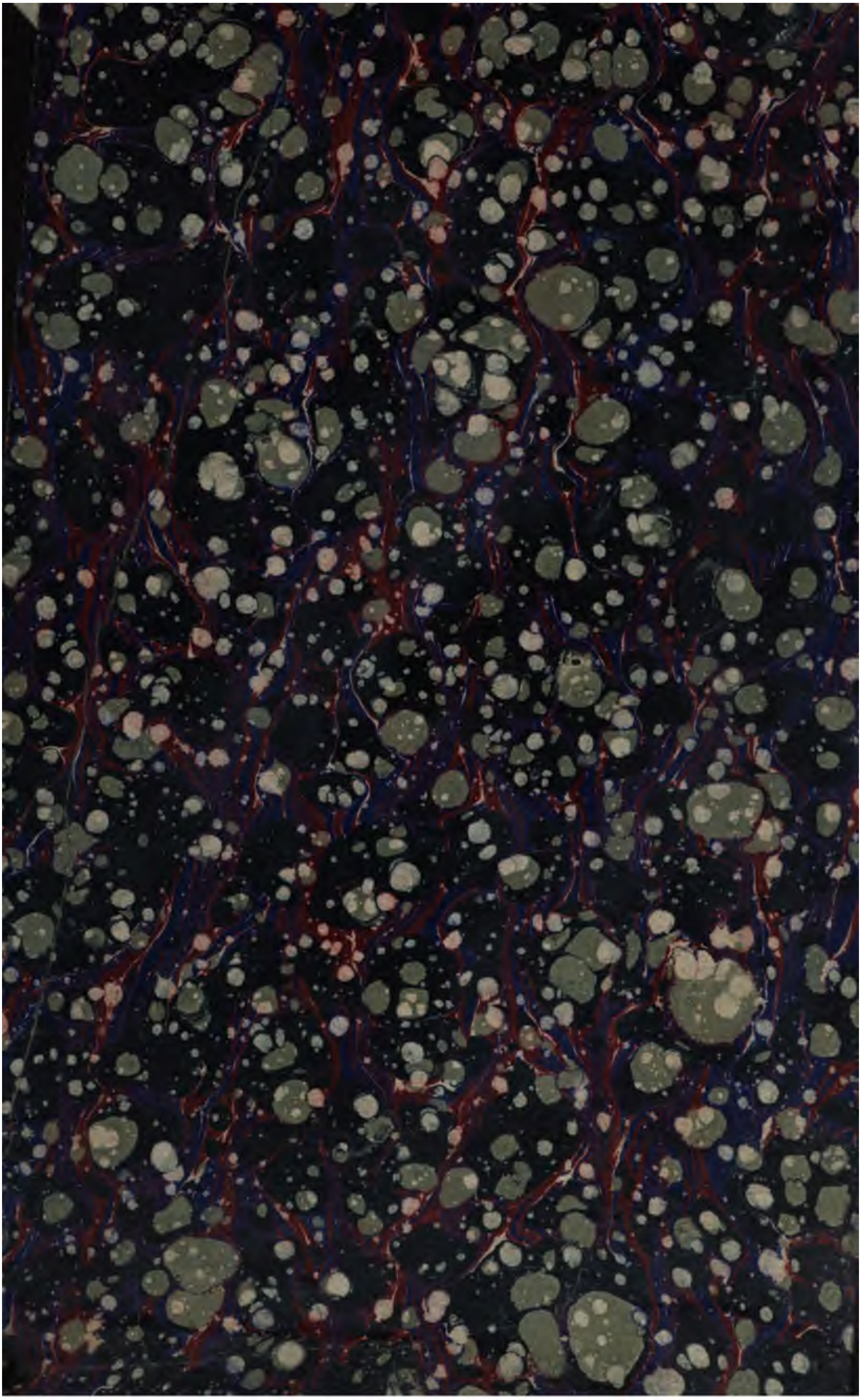

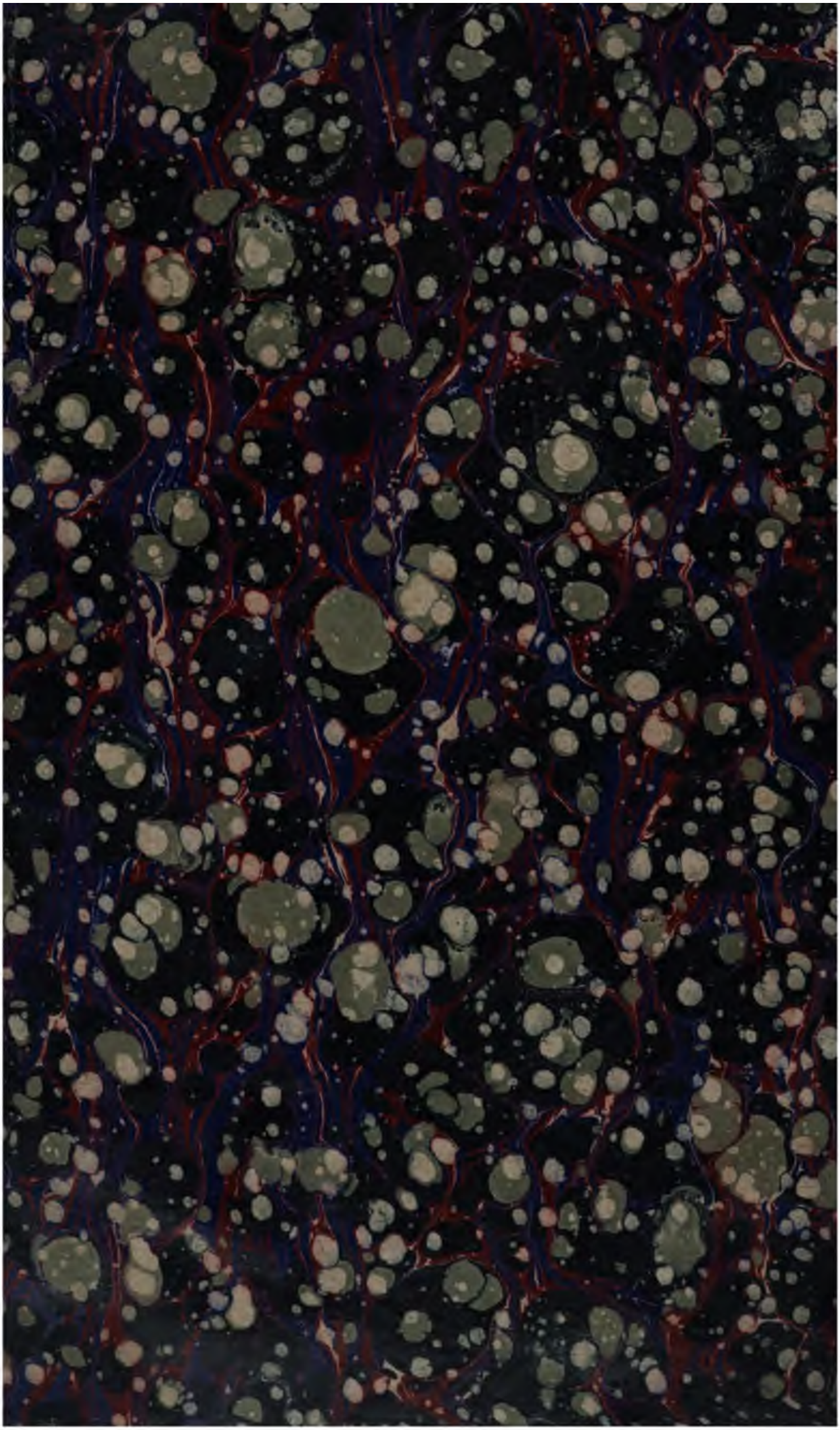

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CONTRIBUTIONS TO THE KNOWLEDGE OF NORTH AMERICAN ARCTIIDÆ, I-II.

(PLATES I AND II.)

BY OTTO SEIFERT.

Arctia arge *Drury*.

In the neighborhood of New York city, on dry, sunny hillsides and scanty pastures under loose stones and rubbish, two kinds of *Arctia* caterpillars may be found in numbers late in fall and again early in spring before the new vegetation has made much progress.

One of these, hibernating most frequently nearly full grown, is the grayish-brown, long-haired larva of *Arctia arge*; its flesh colored dorsal, subdorsal and infrastigmatal angular band, as well as the pale, long rather soft vestiture distinguishes the larva easily from all others which may be found under the same circumstances. All the *arge* larvæ have the stripes distinct and plain, mostly flesh-colored, less frequently cream-colored or variegated with reddish spots; the ground color of body varies from dark gray to brown, always with darker patch-like shades.

The moth appears during the latter part of April and is common in the beginning of May; contrary to most of its relations the female of *arge* deposits her eggs in regularly arranged masses from 25 to more than 200 securely fastened to the underside of a leaf of one of the numerous food plants or in a rather uniform broad ring around the withered branchlet of an aster or a decayed flower-stem. The white color of the eggs, when exposed in this way, correspond with the objects they are attached to. The shape of the eggs as well as the reticulations are nearly the same as of most of the *Arctia* but are decidedly more rounded at the apex. Newly deposited they are maize-colored, turn quickly opaque white and by degrees change from pale pink to lilac and at last to dull slate. The micropyle as a dark spot is plainly indicated very soon after the egg is laid. The larva and its early stages are well known; the egg-state lasts 9 to 10 days, the larval period at least 38 days and the imago will appear after not less than 12 days of pupal rest. A large number of the individuals of a brood follow this rule, but as with most of their related species the irregularity in the development of the same progeny is obvious. Larvæ of the same brood may yet be feeding, while imagines are already at large; hence a continuous propagation takes place and the moths as well as the larvæ are present from early spring to rather late in fall, so that exposed females readily find mates at any time provided the species occurs in the vicinity.

Arctia arge exposed and found mated near New York city, 2, v. 11, v. 29, v. 4, vii. 16, vii. 17, viii. 23, viii. 30, ix.

Arctia nais, exposed and found mated near New York city, 14, v. 17, v. 19, v. 31, v. 8, vi. 6, vii. 26, vii. 10, viii, 4, ix. 22, ix. 1, x.

The pupa, compared with those of the group *Apantesis* Wlk. (Dyar, Revis. N. A. Bombyces) is more raised on first abdominal segments; the cremaster terminating in a blunt, furrowed, jointed spine with short, knobbed hooks around the end, to which the empty larval skin tenaciously adheres. The variability of the imagines is limited to a more or less extension of the pinkish cream-colored bands on primaries and the number, size and intensity of the black spots on secondaries and more restricted to the females, the variegated attempts of the pink and salmon-red shades to extend and intensify. The black abdominal spots are also liable to change in size, but are very rarely confluent to bands (female) ventrally. This is the case, though with a melanotic form (male), where the black of primaries is very intense and prevailing, the cream color limited to the veins only; the secondaries are smoky black, deepest and almost forming a broad band on outer margin diminishing towards the base of wing, the triangular discal spot well defined but narrow. The under side uniformly dusky, blackish with fine pale veins, costal margin deep red.

Freshly formed pupæ exposed to a temperature of about + 38° C. (100° F.) for 100 hours gave after six days, male imagines with the black color on primaries much reduced, the pale bands aiming to unite, bands 2 and 3 often confluent forming with the broad longitudinal bands a large median patch; the black maculation on hind wings mostly reduced to mere dots. The black dorsal spots on abdomen greatly obliterated often only the two faint last ones present; ventrally and laterally the spots diminished likewise. Apparently nothing was gained by the experiment but an extreme southern form of *arge*. The females thus obtained deviate from the males in the same manner as if normally developed. The males striving to simplify their coloration, while the females, though widening the pale bands also but more reluctantly, at the same time intensify their colors; the black on fore and hind wings turning deeper and brighter and the salmon red of secondaries spreading and deepening.

Freshly formed pupæ exposed to + 4° C. (38° F.) for thirty days or more, and at once or gradually transferred to normal temperature gave imagines according to the retarding process in about ten days.

All the moths thus obtained have the black on primaries intensified but rarely more extended than with many of the normal forms, but the secondaries are changed in a remarkable degree. The black maculation is enlarged but paler and a dusky or blackish hue cast over the whitish (♂) or reddish (♀) color. Contrary to the melanotic form (Standfuss, Handbook), where the darkening process commences from outer margin, the black in the forms by cold is spreading radiate from the base of the wing towards outer margin. Below, basal and median part of wings much obscured by blackish shade.

The black abdominal spots are confluent to bands ventrally and with some individuals even laterally and dorsally. Even by exposing the pupæ to a temperature far below the freezing point for about 24 hours the results were practically the same.

Among the number of specimens thus obtained many attain superficially a resemblance to *Arctia quenselii* Payk.

The rearing of progenies of thus changed parents to confirm the transmission of acquired characters (Standfuss, Iris, xii, 1899), have on account of the difficulty in raising the offspring of thus manipulated parents been unsuccessful; the larvæ could not be carried beyond 4th moult.

A female changed in the above manner by cold, was exposed August 10th (Long Island) and found with a typical male next morning. The brood obtained was a very sensitive one. Part of the pupæ were again transferred to ice, the remaining ones left to normal development; these latter rendered only two perfect imagines, male and female. The primaries of the male have the black color above not more produced than some of the darker varieties of the regular forms; the hind wings are more pinkish than white, somewhat diaphanous with numerous maculations. Below the resemblance to the aberrative female parent is plain, not only have the primaries a dusky shade spreading from the root of the wing towards median space, obscuring the pale color, but the two rows of ventral spots are also confluent into broad bands. The female has the dusky shade below also, but in a less degree and with large normal broods females are always found with a similar dusky shade; the lateral and ventral abdominal spots unite to broad bands leaving only a narrow median line connected with the limited transverse lines between the black bands. Those pupæ retarded by cold rendered imagines behind the normal size, the abdomen with all of them banded ventrally, primaries not materially changed but the black color more prevailing than in normal forms, hind wings even with males pale pinkish, subdiaphanous with profuse maculations. Below, the black of primaries mostly dominant, the pale bands greatly reduced.

EXPLANATION OF PLATE I.

Fig. 1. Normal male.
Fig. 2. Normal female.
Fig. 3. Male; pupa exposed to + 35 to 42° C. from July 4–10; imago, July 13.
Fig. 4. " " " " " " 100 hours; imago, July 15.
Fig. 5. Female; " " " " " " " July 16.
Fig. 6. " " " " " " " June 20–27; imago June 30.
Fig. 7. Male; pupa on ice, July 30–August 1; imago, August 13.
Fig. 8. Female; " " " " " August 11.
Fig. 9. Male; " " " " " " August 13.
Fig. 10. Female; " June 23–July 21. + 14° C July 21–August 10. + 22° C. until imago, August 18.
Fig. 11. Female, pupa on ice for 7 weeks.
Fig. 12. ♂ Melanotic form. Larva collected. Nov.; reared on *Cichorium endivia.* Imago January 13.

Arctia nais *Drury.*

The species of the group *Apantesis* Wlk. (Dyar, Revision of Bombyces), besides many other congenial qualities, show a most indifferent, careless way in distributing their eggs. They may be deposited in irregular patches on the undersides of leaves which the larvæ never will touch (eggs of *A. vittata* on underside of leaf of *Ailanthus glandulosa* shoot), on pieces of wood, paper and other objects or are scattered or in clusters on the bare ground. The eggs are not fastened tightly, but are easily removed.

Though all Arctiidæ are more or less polyphagous, the forms belonging to this group are inclined to prefer *Taraxacum* and *Plantago major* to any other herb. The color of the eggs of all the species is yellowish-white or pale straw color, rather bright with fine reticulations, with naked eye they appear smooth; they have the shape of blunt cones with shallow bases. The width of the eggs of *nais* at base is about 0.7 mm. and from vertex to base 0.6 mm. A sound, normal female deposits at least 500 eggs. Of the three species occurring in the vicinity of New York City, *A. nais* prefers the dry, scanty hillsides and pastures; *A. phalerata* meadows, even damp ones, where on sunny fall days the larvæ may be found basking in the morning sun on the branchlets of asters, etc.; *A. vittata* seems to be more inclined to frequent the grassy borders of woods, or rich forest lawns and meadows.

Arctia nais, on account of its habits, is the most common species near New York. The larva in all its stages has been described by G. H. French (Papilio, II, p. 179), but when reared in large numbers and of different broods the variability of the larvæ is striking, and in some individuals where the typical pale dorsal band is obscured or entirely obliterated, they can not be distinguished with certainty from some of the varieties of the other species.

To obtain some information about the variations of *A. nais* and its larva, numerous broods were reared from May to September and even during winter. (Eggs obtained December 3d and 4th, imagines from March 17th; larvæ fed with cultivated *Cichorium endivia.*)

The larvæ after fourth moult attain in general their specific brown to blackish color, the dorsal stripe often obscured but traceable. Achieving after sixth moult their maturity, they vary from yellowish-brown to dull walnut, and from rich seal-brown to velvety black. The dorsal stripe changes with individuals of the same brood from dusky white to nankeen and flesh-color to reddish. The stripe is often obscured on the thoracic and the terminal segments, sometimes only observable on the anterior of segments or not traceable at all. The color of the bristles varies according to the ground color, but those directed from anterior warts of first segment partly over the head of the larva, and all the bristles directed downward from stigmatal warts and below are much paler and vary from brownish-gray to rust-red. In general the deeper and more intense the color of the larva, the more obsolete the dorsal stripe and the brighter the reddish bristles.

The shortest duration from depositing of the eggs to the imago state under the same thermal conditions and maintenance varies from 48 to 58 days.

4 ♀ ♀ exposed May 15.
Eggs depos. May 16, 17, 18,
" commence to hatch May 23.
Larvæ commence to pupate June 24.
Imagines appear July 4.
The majority July 10–12.
Many larvæ still feeding, July 30.
Duration 49 days.

♀ exposed May 17.
Eggs depos. May 19 to 27.
" hatch May 29 to June 7.
First pupæ July 7.
" imagines July 17.
Majority until July 22.
some larvæ still feeding.
Duration 58 days.

♀ exposed May 29.
Eggs depos. May 30.
" hatch June 5, 6, 7.
First pupæ July 4.
" imagines July 17.
♀ exposed June 7.
Eggs depos. June 8.
Imagines appear July 2.
Duration 48 resp. 54 days.

In forming their cocoons the larvæ show a similar indifference as the females do in depositing their eggs. As a rule the larva spins an ample loose cocoon and sometimes more than one caterpillar try to find shelter within a forming one; often the pupa is simply hidden in the fold of a large leaf or directly exposed on the ground. Generally the pupæ have a bluish bloom cast over them but often this bloom is entirely lacking; with many the reddish-brown incisions on movable segments do not darken but remain reddish-brown. Mostly the empty larval skin will adhere to the minute discs or buttons with which the diverging bristles on cremaster are crowned.

The remarkable variability of the imagines in both sexes of this flexible and pliant species, is nevertheless bound to certain limits. The characters inclined to variation are with all the species of the *Apantesis* group the same, only does every species aim at another ideal and consequently the majority of its individuals develop in a direction different from those of the other species. The females of all the forms of this group seem to be far more conservative than the males. The animation or stimulus to variation and its direction seems solely to rest with the parents. Notwithstanding the comprehensive and convincing experiments of Standfuss (Handbook) and others to the contrary many entomologists still maintain that the food-plant might be cause of variability of a species. A trial in this respect was made with one generation of *nais*, though evidently the food-plant could be of no concern to such a polyphagous species.

Four females, all with red hind wings, were exposed May 17th and 18th in Long Island and Westchester Co. One part of the newly-hatched larvæ were reared solely on *Taraxacum* and *Plantago;* another part was fed on *Rumex acetosella* and the remaining third on *Artemisia absynthium.* The result was that those larvæ reared on *Taraxacum* and *Plantago* developed in the most satisfactory manner, the imagines including all varieties in perfect examples; while the part raised on *Rumex acetosella* gave also the varieties in the same proportion as the first part, but every one of the number behind the regular size and of sickly appearance; those fed on *Artemisia absynthium* all died before pupating.

In *A. nais* male and female the costal margin is always black and even with the varieties which have the ≥ mark most complete, this latter never impairs the black costal margin. The subcostal and submedian longitudinal stripes are in both sexes often much reduced, the former sometimes not reaching transverse posterior band, the latter forming a fork with the median longitudinal band, which always reaches to transverse posterior stripe.

The males of *nais* have pale ochre yellow secondaries, often more or less tinged with reddish, the red color always originating from root of wing, streak-like, most profuse generally near abdominal margin. Originally perhaps the hind wings of the male had a black marginal band, as many of the females have now, but with the many hundreds reared under normal conditions and seen elsewhere in collections, this band is always dissolved into spots, often reduced to dots and sometimes obliterated altogether except one large, black apical spot attached to the costal black shade. Comparing a large series of both males and females, the breaking of the marginal band seems to originate right below apex by the fork-like inroad of the ground color, separating at first the band in three unequal parts; the thus acquired character may be aggravated by transmission.

The females either have deep ochre-yellow or red hind wings, sometimes, but not frequently suffused; they are either bordered by a black marginal band or this is broken into three or more prominent spots of unequal sizes. The band is nearly always, though often very slightly, inverted below apex, the ochre or red color forming a tooth-like indention, which traced through a series of specimens gets forked and finally separates the band into three parts. This reduction of the marginal band into spots is always accompanied by the development of the ≥ mark on primaries, so that not an intimation of the ≥ mark exists where the black marginal band is most complete and it is generally most developed when the band is broken into nearly two rows of spots. The band or its fragments rarely interfere with the discal spot and the color of the hind wings is altogether independent from the markings.

How important a factor the transmission of parental characters is in respect with the variability the trials will show; unfortunately not always the male could be secured with the exposed female, but as copulation within the same progeny was undesirable this could not be overcome.

♀ exposed May 28th.
≥ mark narrow but distinct.
Secondaries reddish; black marginal band partly broken up into spots.
♂ not obtained.
105 perfect specimens examined.
♂ ♂ 47. ♀ ♀ 58.
♂ ♂ with ≥ mark or indication of it: 39.
♂ ♂ entirely without ≥ mark : 8.
♀ ♀ with ≥ mark or indications: 32.
♀ ♀ entirely without ≥ mark 26.
♀ ♀ with yellow hind wings, none.

♀ exposed June 8th.
♀ with yellow hind wings and without ≥ mark on primaries.
♂ with broad ≥ mark and faint reddish tint on secondaries near root of wing.
Marginal spots of secondaries much reduced.
113 perfect specimens examined.
♂ ♂ 63. ♀ ♀ 50.
The whole offspring with yellow hind wings.
♂ ♂ with ≥ mark 47.
♂ ♂ without ≥ mark 16.
♀ ♀ with ≥ mark 11.
♀ ♀ without ≥ mark 39.

♀ exposed May 14th.
♀ without ≥ mark on primaries.
Secondaries red with black marginal band.
♂ with very plain ≥ mark, hind wings without reddish tint.
200 specimens examined.
♂ ♂ 78. ♀ ♀ 122.
♂ ♂ with ≥ mark 23.
♂ ♂ without ≥ mark 55.
♀ ♀ with ≥ mark 4.
Two of these with red and two with yellow hind wings.
♀ ♀ without ≥ mark and red hind wings 118.
♀ ♀ without ≥ mark and yellow secondaries 20.
All the ♀ ♀ of this brood with black marginal band, except the four with ≥ mark.

♀ exposed May 14th.
♀ with red hind wings and distinct ≥ mark on primaries.
♂ not examined.
150 specimens examined.
♂ ♂ 75. ♀ ♀ 75.
♂ ♂ with ≥ mark 75.
♀ ♀ with ≥ mark 75.
♀ ♀ with red secondaries 35.
♀ ♀ with yellow secondaries 40.

The broods derived from females exposed May 14th have been reared under normal conditions; the individuals of each of the other two were partly submitted to high or low temperature.

A temperature of + 40° C. for 100 hours or + 4° C. for 30 to 40 days had the peculiar effect on newly formed pupæ of *nais* to produce asymmetrical results in regard to primaries and secondaries irrespective of sex, but more pronounced with females. Heat as well as cold caused a tendency to expand the longitudinal and mostly always present but rudimentary transverse posterior stripes on primaries often to such an extent as to leave only two limited streaks of black color above and below median band, never impairing though the black costal margin or spreading practically beyond transverse posterior stripe.

Heat affects the secondaries of the males by a reduction of the black maculation, whilst the pale ochre color turns lighter but brighter. The discal spot weak but mostly as in the normal forms present. With the females heat reduces the black marginal band or maculation perceptibly and intensifies the color, animating the vital activity even so far as to produce ultimately true melanotic forms.

Exposure to low temperature, with both sexes, enlarges the black maculation or marginal band decidedly, often even with the males uniting the black spots to an irregular band, the black color losing though much of its deepness.

The red or yellow color of the hind wings is not dependent on thermal conditions and the inclination to melanism seems to be confined to the female forms with yellow hind wings.

The larvæ of *A. nais* and related species are often infested by a dipterous parasite, *Thelaira leucozona* Panz., which fastens its eggs mostly on the head of the larva. Wintering larvæ not carefully attended to are subject to muscardine to an alarming extent.

EXPLANATION OF PLATE II.

Fig. 1.	*Arctia*	*nais*,	male;	found in copula with exposed ♀, June 8.	
Fig. 2.	"	"	"	imago,	June.
Fig. 3.	"	"	"	"	July.
Fig. 4.	"	"	"	"	July.
Fig. 5.	"	"	female;	"	July.
Fig. 6.	"	"	"	"	May.
Fig. 7.	"	"	"	"	December; reared on *Cichorium endivia*.
Fig. 8.	"	"	"	"	" " " " " " "
Fig. 9.	"	"	"	"	" " " " " " "
Fig. 10.	"	"	male;	pupa on ice,	July 10 to August 10; imago, Aug. 19
Fig. 11.	"	"	"	" "	July 20 to August 20; " " 30

Fig. 12. *Arctia nais*, male; pupa on ice, July 10 to August 10; imago, Aug. 27
Fig. 13. " " " " " " 8 to " 14; " " 25
Fig. 14. " " female; " " " 7 to " 14; " " 24
Fig. 15. " " " " " " 8 to " 14; " " 25
Fig. 16. " " " " " " 7 to " 14; " " 24
Fig. 17. " " " " " " 7 to " 24; " " 31

Fig. 18. " " female; pupa exposed to + 35–+ 42°C., from July 21-26; imago, July 30. Melanotic form.

Fig. 19. *Arctia nais*, male; pupa exposed to 35–+ 42° C., July 23–July 26; imago, August 1.

Fig. 20. *Arctia nais*, male; pupa exposed to 35– + 42° C., July 20–July 25; imago, July 29.

Fig. 21. *Arctia nais*, male; pupa exposed to 35– + 42° C., July 20–July 25; imago, July 29.

Fig. 22. *Arctia nais*, male; pupa exposed to 35– + 42° C., July 20–July 25; imago, July 30.

Fig. 23. *Arctia nais*, male; pupa exposed to 35– + 42° C., July 20–July 25; imago, July 29.

Fig. 24. *Arctia nais*, male; pupa exposed to 35– + 42° C., July 20–July 25; imago, July 31.

◆

LIFE-HISTORY OF AËDES SMITHII *COQ.*

By John B. Smith, Sc.D.[*]

As Dr. Harrison G. Dyar has described and figured the larva of this species in the last number of this Journal (Vol. IX, p. 178), I will not again rehearse the characters given by him.

My first acquaintance with the insect began in late November, 1900, when Mr. J. Turner Brakeley called my attention to the fact that, in the pitcher plants in the swamps surrounding his cranberry bogs at Lahaway, there were what he thought mosquito larvæ. The matter did not interest me very strongly at the time. I verified the fact that they were mosquito larvæ and, because that species was common about there, I assumed that it was *pungens*. Dr. Howard's pamphlet on mosquitoes had been not long since published, and the larvæ in the leaves of the plant fitted to his pictures and description sufficiently well. As *Culex pungens* breeds everywhere, it did not strike me as especially odd that the larva should be in the leaf pitchers, and I assumed that they were, probably, present in the bog holes and ditches as well.

In reply to the question, what will become of these larvæ, I informed Mr. Brakeley that *Culex pungens* hibernated as an adult; that the larvæ are dependent upon atmospheric air and that these specimens would undoubtedly die when the winter fairly set in. Mr. Brakeley looked unconvinced; but said nothing at the time.

January 22, 1901, after a spell of bitter cold weather Mr. Brakeley sent me a jar of living larvæ and a statement of how they had been found frozen solid in the leaves of the pitcher plants. The account of my experiments with these larvæ and the record of the early breedings is given in Entomological News, Vol. XII, p. 153, for 1901. It is also printed on pp. 83–90 of Dr. Howard's Mosquito book.

This carries the life-history to the point when, under laboratory conditions, I secured a few adults which I mistook for undersized, immature *Culex pungens*. Later, Mr. C. W. Johnson determined a specimen as *Aëdes fuscus* and under that name the species is several times referred to in the minutes of the meetings of the Feldmann Social, published in the Entomological News.

As the season progressed, Mr. Brakeley kept sending in larvæ and these matured in such numbers that I was able to supply material in sufficient quantity to enable Mr. Coquillett to determine that instead of *Aëdes fuscus* we had a new species to deal with: one which will have to descend to posterity as a member of the Smith family unless perchance it proves to have been previously described.

Mr. Brakeley kept a duplicate series of specimens under observation at Lahaway and his first pupa, from larvæ thawed out of ice February 17th, was obtained April 16th and became adult on the 26th. This gives a period of 58 days in active larval life at an ordinary indoor temperature, or 68 days if the pupal period is counted. Other pupæ and adults developed and the pupal period ranged between 10 and 12 days.

A small lot of specimens gathered April 7th, began pupating May 1st and these had an average pupal period of eight days.

Altogether Mr. Brakeley sent me, prior to May 1st some 15 to 20 lots of larvæ, numbering many hundreds of specimens. All these were kept in the original pitcher leaf water and this never became foul. It required the contents of from 40 to 75 pitchers to make a full pint of liquid and the larvæ numbered from 2 to 20 or more in each leaf. Culture after culture was closed out during the summer; but though the conditions for all the larvæ in a single jar were absolutely the same, the rate of development varied in each individual. One quart jar, containing nearly 200 larvæ received in early March, developed adults throughout the summer and this was not closed out until September 13, 1901, six months after its receipt, when there were yet a few larvæ, two or three pupæ and one or two adults! These larvæ had been surely hatched in November, 1900, and had remained in that condition for certainly ten months, including the entire summer.

May 31, June 1 and 2, were spent at Lahaway with Mr. Brakeley, and during those days the swamps for some distance around were visited and dozens of pitcher plants closely examined.

In the areas flooded during the winter by cranberry bog operations, no larvæ were found; but as soon as the flood line was passed, larvæ were taken; generally half a dozen or more to a leaf. But none occurred except in the leaves. This point was tested very thoroughly throughout the season and it is absolutely certain that this little species does not occur anywhere outside of the receptacles formed by *Sarracenia*, except by accident. In the colder, shaded parts of the swamp, where springs occurred, larvæ only were found. In the warmer areas pupæ were common and, in some places, where the water and moss surrounding the plant were actually tepid, the insects had already emerged and nothing but empty pupa shells could be found. It seems to be entirely a matter of temperature and, in some of the coldest places, no transformations would be likely to occur much before late June. It is certain that most hibernating larvæ live from early November to late May or early June, a period of fully six months. No adult *Aëdes* could be found and certainly none made any attempt to bite. Nor could egg masses or young larvæ be discovered at this time. New leaves were developing on the pitcher plant groups; but few had the lobes opened and fewer yet contained any water. Such of these as were examined contained no insect life and only here and there one had trapped insects; none had begun to digest or assimilate the animal food.

An open swamp at the head of a cranberry bog had most of the leaves with pupal shells only; but though there must have been hundreds of adult *Aëdes* about, not one could be found flying, nor could we stir them up. In a deep, cold, huckleberry swamp, only larvæ were found. It was fair to conclude from the three days' tramp that no summer brood of larvæ had yet begun, and it seemed strongly indicated that *Aëdes* would not bite, even if given the opportunity. In confirmation it may be said that late in the summer Mr. Brakeley saw *Aëdes* flying, and though there must have been thousands round about, none made any effort to disturb him.

Unfortunately Mr. Brakeley could not be at Lahaway during the summer; but arrangements were made to ship into New Brunswick at ten-day intervals the contests of from three to six pitchers, that I might be kept posted as to developments. The intense heat of midsummer and a fire which destroyed barn and horses interfered with the regularity of the sendings.

July 3d, the leaves contained half and full grown larvæ; but neither pupæ nor very small larvæ. July 13th, old and new leaves contained very small larvæ—evidently of recent date, while the old leaves had also full grown larvæ and pupæ. There was, therefore, a new series of larvæ and probably the first summer brood. July 23d, the older leaves had very few larvæ; but almost as many very small as large ones. The new leaves had all stages, from very small larvæ to pupæ. The indications were, therefore, that the first summer brood was coming to maturity, developing in from 15 to 20 days, while there are yet adult individuals from the winter larva that are ovipositing. From the small number of young larvæ in individual leaves, the indications were that eggs were laid either singly or in small groups.

The next sending did not come until August 21st, and then there was everything from the most minute larva to pupæ just ready to transform. So small were some of the larvæ that I hunted for eggs or egg-shells; but failed to recognize any. It is probable that the youngest larvæ represent a third brood; but breeding is practically continuous: all stages being found at any time after the middle of July.

September 1st, the same conditions existed and there was a large number of larvæ so small that it seemed as if at least egg-shells must yet remain; but none were found. Fortunately Mr. Brakeley returned to Lahaway early in this month and on the 13th—lucky day—he found the eggs floating on the surface of the water in the pitcher plants.

September 14th I had an opportunity to spend a couple of hours in a swamp in the pines near Hanover Station, Burlington County, and found the pitcher plants there full of the *Aëdes* in all stages from babes to pupæ. Collected the entire contents of a number of the pitchers in alcohol, and found afterward that eggs were present in some numbers. But meanwhile Mr. Brakeley had positively identified the eggs and had even bred from them a lot of larvæ, making the relation absolutely certain. He collected from time to time until October 20th, and found anywhere from 5 or 6 to 30 or more eggs in a single leaf. Oviposition was continuous; but on only two occasions were adults seen apparently engaged in the process. It may be that the egg-laying is done mostly at night.

After the eggs had once been identified there was no difficulty in finding them; but it was noted that in the older leaves where larvæ were now most abundant, eggs were not so plentiful as they should be to account for the large winter supply. So attention was directed to the younger leaves even where there was as yet no water in them. Here, it was discovered, was the favorite place for ovipositing, with this species. Eggs were laid in leaves as yet perfectly dry; at the bottom and at the sides; singly or in little groups; whether by one or more than one female was not ascertained. Of the old leaves many become imperfect in late fall and any puncture or decay allowing the water to escape, would of course mean the death of the larvæ. So the new leaves are selected and in them many more eggs were found than in the others. In one case Mr. Brakeley counted up to 75, then lumped the remainder and called it 100. It is scarcely probable that any one female of this species is capable of producing 100 eggs of the comparatively large size of those in question; so two at least and possibly more females may oviposit in a suitable leaf.

Observations were continued until frost, which came unusually early in 1901. Up to November eggs were found and, early in that month, a few pupæ. So breeding is continued just as long as there is a chance to keep it up.

The eggs are chestnut brown in color, somewhat chunky, bean-shaped, the ends somewhat pointed, the inner margin nearly straight. There is no evident sculpture; yet when first mounted and examined under the microscope, there seems to be a somewhat irregular tessellated reticulation that disappears later, when the shell becomes more transparent.

In the previously published notes it was brought out that this larva does not need to come to the surface for air as much as recorded for *Culex*. Dr. Howard informs me that a lot of larvæ that I sent him lived for nearly two weeks under a film of oil which covered the surface of their breeding jar.

One of my students demonstrated in the laboratory a very complete tracheal system in the anal processes of the larva; so we have really a gill structure, by means of which the insect gets its supply of oxygen directly from the water.

Briefly stated, the life history is as follows: The insect winters in the larval stage, freezing and thawing as often as need be during that season. It pupates late in May and becomes adult a week or ten days later. Eggs are laid in the leaves singly or in small groups; fastened to the sides or floating on the surface. The summer broods mature in about a month, and there are probably three if not four series; but the broods overlap so much that the breeding is practically continuous. Late in the season the adults select the new leaves for oviposition even if they are yet dry.

There is little difference in appearance between the sexes and the antennæ of the male are hardly plumose.

In New Jersey the larvæ breed in the leaves of *Sarracenia purpurea* only; but not everywhere, for Mr. E. L. Dickerson, who examined a large number of plants for me in Morris County, says positively that there are no mosquito larvæ in any of them. Whether exceptionally or normally, the water in the plants examined by him was foul, and in such a mixture this larva does not live. On the other hand, Mr. D. W. Coquillett tells me that he has the species from Florida, where it breeds in the leaves of an orchidaceous plant growing on trees.

This is the Jersey mosquito for which I claim that it does not bite!

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NOTES ON THE LIFE-HISTORY AND HABITS OF ONCIDERES TEXANA.

BY GLENN W. HERRICK.

While inspecting nurseries in Biloxi and Ocean Springs, Mississippi, the writer noted that the branches of many pecan trees in the nursery rows were cleanly severed as though by some insect, probably a beetle. On further investigation a puncture in the bark just beneath every bud on the severed portion was evident. In the majority of these punctures was found a minute egg, from which the larvæ and pupæ of *Oncideres texana* Horn, have been reared and observed for nearly two years.

Mr. James Brodie of Biloxi, has aided me greatly in observing the habits of the adults and in sending me material. I shall frequently quote Mr. Brodie's own words.

So far as the writer is aware nothing has been recorded in regard to the life-history of this beetle.

Dr. Riley has contributed several short articles to the American Entomologist on *O. cingulata* which however are incomplete and hence the following notes may be of interest.

Eggs.—These were imbedded between the bark and wood in perforations made by the female beetle. The opening was closed by a gummy secretion. The eggs are about two and one half millimeters in length, of a whitish color, and oval in shape. Those under observation were laid in October of 1900 and hatched in about one month. The time of hatching is not definitely known because we were anxious to rear the adults and so did not like to examine the eggs and thus destroy them. Each egg is laid beneath a bud and rarely beneath a small branch if it be not more than one year old.

In every case coming under my observation or that of Mr. Brodie, a peculiar scarring of the bark from the egg down the branch for two or three inches was found. The female, after laying her eggs, digs with her mandibles, transverse shallow grooves one-sixteenth to one-eighth of an inch long in the bark, along the probable course of the burrowing larva. These grooves are close together and give to the bark its peculiar scarred appearance. No doubt it is done to deaden the bark and prevent growth from crushing the egg. Where an egg is laid beneath each bud, the series of grooves often extend from bud to bud. Thus the whole severed portion may be scarred. Dr. Riley mentions nothing of the kind in regard to *O. cingulata*, and we conclude that the species differ in this particular.

So far as observed the eggs are laid only in the severed portion of the branch and I should expect this to hold true in every case.

Larvæ.—These are white in color and from one-half to three-fourths of an inch long. They vary much in size. In the first place, I judge those destined to produce females are larger than the others. In the second place a difference in the amount of nutriment obtained, no doubt has something to do with the variation.

When looked at with a lens the body is found to be sparsely clothed with very short, dark, hairs. The mouth parts are black and protrude. After hatching they soon burrow a little distance into the wood and remain there until warm weather. During the following spring and summer they excavate galleries in the dead branch just beneath the bark. Occasionally one is found burrowing in the solid wood. They grow rather slowly and apparently little wood satisfies them. In one branch, three-eighths of an inch in diameter, two larvæ came to maturity in galleries not over five inches long. Of course the two galleries occupied nearly the whole branch, only the thin bark and a thin partition wall remaining.

The larvæ exist in these cut-off branches one year in most cases and then pass into the pupal stage within the gallery. Some larvæ certainly pass another winter in the branches. These are evidently those that for some reason have not grown rapidly, owing possibly to insufficient nutriment. Among several branches examined in January, 1902, two larvæ were found that had not changed to the pupal form. They were not over two-thirds grown and most certainly will remain as larvæ until warm weather.

Before the larva changes to a pupa, it cuts a pinhole in the bark near the end of the gallery, and closes up the opening of the burrow behind with long thread-like shavings. The pupal cell is thus furnished with an opening to the outside for air and egress when the proper time comes.

Pupæ.—On account of my intense desire to obtain the adults, the larvæ were disturbed as little as possible and consequently the exact time of change to the pupal form is not known. It was some time between October 12 and November 12, 1901. On the former date, two were examined and found still in the larval state. On the latter date they were pupæ. This gives approximately one year in these two cases for the development of the larvæ.

The pupæ are also white with short dark-colored spines on the dorsal sides of segments. They vary from seven-sixteenths to five-eighths of an inch in length and lie in burrows in most cases as described above until some time during the following summer. The pupæ under observation at this time, January, 1902, developed from eggs laid in October, 1900, have not changed to the adult form with one exception, and can hardly be supposed to do so until warm weather. The one exception noted was the case of a pupa that had attained the adult form in the autumn but for some reason was not able to issue from its cell and died. So it is possible that in some cases one year may complete the life-history.

In October of this year I found many larvæ in branches of oak and the adults were then depositing their eggs in a tree near by. This fact puzzled me at the time but when I learned that the pupæ lived over another season it became plain that these were the adults of last year's larvæ.

Adults.—These are grayish beetles from one-half to five-eighths of an inch long. The male is the smaller and has longer antennæ. The antennæ of the female are only slightly longer than the body while those of the male are considerably longer. The wing covers are marked with irregularly roundish, red spots. The middle third (approximately) of each wing cover is rather densely clothed with gray hairs which give this part a distinctly grayish appearance. The proximal (especially) and the distal thirds are less densely clothed, hence darker in color. The thorax is light gray but the vertex of head and face are covered with reddish hairs.

Habits of Adults.—It is evident from continued observation that these beetles almost invariably work in pairs. Mr. Brodie says: "The result of further observations keeps me convinced that they work in pairs. The male is the smaller, and the fact that I frequently find them copulating proves they are in pairs. If the male is not in company with the female he is not far away. I invariably find him at the point or base of the branch the female is sawing. She takes frequent intervals of rest and then they are together and frequently while the female is at work the male is there but in no sense helping or interfering in the work. I have found solitary females working but it was the exception." The female does all the work. After she selects a branch, she stands on it head downward and clasps it firmly with the fore legs. The manner of cutting is described by Mr. Brodie as follows: "In starting work, a patch the desired width of cut is cleaned and the bark eaten. Then the powerful mandibles are brought to work on the wood. A cut is first made at the top, then the head moves gently down to the bottom, where a corresponding cut is made; then working from the bottom cut, the wood fiber is raised and as the piece was cut free to start with at the top it is already detached when the pice is torn loose to the top cut. Then another cut is made at the top; then at the bottom, and so on till the insect reaches in as far as it can conveniently. It then moves to either side of this cut, eats off another strip of bark and goes to work on the wood as before."

Strange to say the cutting in all actually observed cases is done before the eggs are laid. Sometimes enough wood is left to support the branch but often it falls over before the eggs are deposited. This cutting off of the branch is evidently to prevent growth from crushing the eggs and to provide suitable food for the larvæ. In one case where sufficient wood was left for circulation of sap, the eggs were found crushed between the bark and wood.

Dr. Riley infers that the twigs are cut off by *O. cingulata* to keep them on the damp ground where the eggs will remain moist. In the case of *O. texana* I found several branches containing one-year-old larvæ that had lodged in the branches of a thick bushy oak from which they had been cut. These were healthy vigorous larvæ and changed to pupæ later. Of course these larvæ had never touched the ground.

History of a Single Pair.—During the autumn of 1901, Mr. Brodie had the good fortune to be able to observe continuously day by day the work of a single pair and the report is here given in his own words. "Possibly the work started September 28th. I found them November 5th. Then three branches had been cut. Day by day the work went on. The trees they selected were in a nursery row—three-year-old pecans. Nearly all the eggs were deposited in the two-year-old wood. The whole season's work was limited to an area of twenty-five feet by four feet. Six trees were used and, from these, nineteen branches were cut. In the nineteen branches I counted a deposit of one hundred and fifty-seven eggs. These insects remained in company over three weeks. Then the male disappeared and no other returned. Possibly his season of usefulness was passed or he met an enemy. One feature that taxed my patience, was their selection of the best budded trees in preference to the seedling trees standing with them in the same row. December 15th we had a sharp freeze and I surmised that her life work might be ended. Sure enough I found her near the root of the tree on the ground frozen stiff. I held her some time in my warm hand but there was no recovery. Then I held her in my clasped hands and breathed on her 'the breath of life,' and she once more became a living beetle. I left her as comfortable as possible but the shock was too great for her recovery. December 16th we had 14° to 16° freezing and that morning I found a dead beetle."

MALLOPHAGA FROM BIRDS OF THE PACIFIC COAST OF NORTH AMERICA.

By V. L. Kellogg and B. L. Chapman,
Stanford University, Calif.

(Plate III.)

The Mallophaga identified and described in this paper were collected by the authors, or by various students of zoölogy and entomology in Stanford University, from North American birds mostly taken on the Pacific Coast. The majority of hosts were shot in Alaska and California. Only those specimens in this miscellaneous collection of Mallophaga are referred to in this paper which are representatives of new species or which establish a new host record or new locality record for a previously known species. For each species previously described a reference to the original description is given and also a reference to the place of this species in a List of Biting Lice (Mallophaga) taken from birds and mammals of North America, by Kellogg (Proc. U. S. Nat. Mus., Vol. XXII, 1899, pp. 39–100) in which all of the American records, with hosts (together with the foreign records with hosts, if the species has been found outside of North America) are given for each species.

New Mallophaga I, II and III repeatedly referred to in this paper were published as Contributions of the Hopkins Seaside Laboratory of Stanford University as follows: Kellogg, New Mallophaga I, 1896, 137 pp., 14 plates, as No. IV of the Contributions; Kellogg, New Mallophaga II, 1896, 117 pp. 14 plates as No. VII of the Contributions; and Kellogg, Chapman and Snodgrass, New Mallophaga III, 1899, 224 pp., 17 plates, as No. XIX of the Contributions.

Docophorus melanocephalus *Burmeister*, Handb. d. Ent., II, 1839, p. 426; Kellogg, List of Mallophaga, 1899, p. 44.

From *Sterna forsteri* (Leech Lake, Minnesota).

Docophorus fusiformis *Denny*, Monograph, Anoplur. Brit., 1842, p. 84, pl. I, fig. 2; Kellogg, List of Mallophaga, 1899, p. 46.

From *Tringa coues* (Kadiak Island, Alaska).

Docophorus fuliginosus *Kellogg*, New Mallophaga, I, 1896, p. 80, pl. III, fig. 2; List of Mallophaga, 1899, p. 47.

From *Puffinus creatopus* (California).

Docophorus speotyti *Osborn*, Insects Affecting Domestic Animals, 1896, p. 222, fig. 144; KELLOGG, List of Mallophaga, 1899, p. 48.

From *Asio acciptrinus* (Kadiak Island, Alaska).

The specimens, two males, are distinctly larger, especially broader, and more strongly marked than typical representatives of the species.

Docophorus ceblebrachys *Nitzsch*, ed. Giebel Zeitschr. f. Ges. Naturwiss., 1861, XVII, p. 528; KELLOGG, List of Mallophaga, 1899, p. 48.

From *Surnia ulula* (Minneapolis, Minnesota).

Docophorus communis *Nitzsch*, Germar's Mag. d. Ent., III, 1818, p. 290; KELLOGG, List of Mallophaga, 1899, p. 50.

From *Junco hymenalis thurberi* (Palo Alto, California), *Lannis* sp. (Palo Alto, California; Kadiak Island, Alaska), *Pica pica hudsonica*, and *Pinicola enucleator* (Kadiak Island, Alaska).

Docophorus distinctus *Kellogg*, New Mallophaga, II, 1896, p. 477, pl. LXV, fig. 5; List of Mallophaga, 1899, p. 50.

From *Corvus corax principalis* (Kadiak Island, Alaska).

Docophorus rutteri *Kellogg*, Mallophaga from Birds from Panama, Baja California, and Alaska, in New Mallophaga, III, 1899, p. 12, pl. I, fig. 3; List of Mallophaga, 1899, p. 52.

From *Parus atricapillus septentrionalis* (Kadiak Island, Alaska).

Nirmus fissus *Nitzsch*, Germar's Mag. Ent., III, 1818, p. 291; KELLOGG, List of Mallophaga, 1899, p. 54.

From *Aegialites semipalmata* (Pacific Grove, California).

Nirmus complexivus *Kellogg & Chapman*, Mallophaga from Birds of California, in New Mallophaga, III, 1899, p. 75, pl. VI, fig. 3; KELLOGG, List of Mallophaga, 1899, p. 54.

From *Tringa couesi* (Kadiak Island, Alaska).

Nirmus incœnis *Kellogg & Chapman*, Mallophaga from Birds of California in New Mallophaga, III, 1899, pl. VI, fig. 5; KELLOGG, List of Mallophaga, 1899, p. 55.

From *Tringa couesi* (Kadiak Island, Alaska).

Nirmus luprepes, sp. nov. (Plate III, Fig. I.)

Description of female. Body, length, 1.63 mm., width .45 mm.; body pale brown with narrow black marginal markings.

Head, length .4 mm., width .35 mm.; elongate, triangular with clypeus narrowly rounding, the uncolored region expanding slightly in front of the sutures; four marginal hairs, one in the rounding anterior angle of the clypeus, one just behind this, one at the suture, and one in front of the trabeculæ; trabeculæ prominent; antennæ short, reaching barely two-thirds of the distance to the occipital margin, first three segments almost uncolored, last two distinctly fulvous; eyes flat with short prickle and long slender hair; temporal margins broadly rounding, with two long hairs and a short stiff prickle on the margin; occipital margin slightly concave; clypeal signature shield-shaped, constricted slightly anteriorly; anterior half fulvous, posterior half almost uncolored; antennal bands distinct, dark brown and interrupted at the suture, posterior extremity bending sharply in; temporal borders narrow but distinctly dark brown growing paler toward the occipital border.

Prothorax quadrangular; sides slightly diverging; posterior angles rounding with one short hair; marginal borders dark golden brown; median portion pale fulvous. Metathorax with widely diverging sides, strongly angulated on abdomen; lateral angles with three long pustulated hairs, postero-lateral margin with two long pustulated hairs, narrow dark brown marginal markings, anterior extremities bending strongly inward, dark marking broadening in posterior angle. Legs concolorous with the palest color of the thorax; darker brown annular markings.

Abdomen elongate elliptical, posterior angles of the segments slightly projecting; one or two hairs in posterior angles after first segment; four long pustulated hairs on the posterior margin of the segments, two long hairs being near the posterior angles and the other two on each side of the median line; segment 8 with four long pustulated hairs along the lateral margin, segment 9 angularly emarginate with a few very short and one longer marginal prickle. Color fulvous with broad segmental median bands of dark brown to black, broad uncolored sublateral band and uncolored posterior margins on segments 1–8; segment 9 with two pale brown blotches.

From the turnstone, *Arenaria interpres* (Pacific Grove, Calif.) This *Nirmus* belongs to the group *interrupto-fasciata* hitherto found exclusively on passerine birds, especially birds of the finch family.

Nirmus splendidus *Kellogg*, Mallophaga from Birds from Panama, Baja California, and Alaska, in New Mallophaga III, 1899, p. 16, pl. II, figs. 3 and 6; List of Mallophaga, 1899, p. 56.
From *Polyborus cheriway* (Tampico, Mexico).

Liperus ferox *Giebel*, Zeitsch. f. Ges. Naturwiss., XXIX, 1867, p. 195; KELLOGG, List of Mallophaga, 1899, p. 59.
From *Diomedia nigripes* (North Pacific Ocean).

Liperus faralloni *Kellogg*, New Mallophaga I, 1896, p. 103, pl. V, fig. 4; List of Mallophaga, 1899, p. 60.
From *Phalacrocorax pencillatus*, and *P. resplendens* (Calif.).

Liperus mcilhenyi *Kellogg & Kuwana*, Proc. Phil. Acad. Sci., 1900, p. 155, pl. VII, fig. 3.

From *Diomedia nigripes* (California). Previously recorded from same host, Pt. Barrow, Alaska.

Liperus comstocki, sp. nov. (Plate III, Fig. 2.)

Description of female. Body, length 3 mm., width .45 mm.; very long, slender, body no wider than head, fuliginous with dark brown to black marginal bands on the head, thorax and abdomen.

Head, length .45 mm., width .35 mm.; elongate, conical scarcely any wider through the tempels, front rounding, distinctly separated from the head by a suture; a short hair at the suture and two longer marginal hairs in front of the suture; sides of the front diverging but little, with a short fine marginal hair, in front of the small angular trabeculæ a short prickle; antennæ slender, first segment short, second almost as long as the third and fourth segments together; third cylindrical and longer than the fourth, a few short hairs on the segments and several at the tip of the last segment; color pale fuliginous, darker on last three segments; eye small but distinct with one prickle; temporal margins parallel, one short marginal prickle just below the eye, one more on the lateral margins of the temple and two short prickles and one long hair on the rounding temporal angle; occipital margin acutely concave; signature shield-shaped, extending to front margin of head, pale colored anteriorly, darker brown behind, a distinct suture extending from posterior angle along the median line not quite to the anterior margin of the signature; this suture extending posteriorly almost to the mandibles; antennal bands broad and dark with the anterior and posterior ends curving inwardly, temporal margins bordered with dark brown, paling inwardly.

Prothorax almost square, anterior angles rounding, bare; posterior angles acute with one short prickle; ground color fuliginous with uniform dark lateral bands which bend inwardly at the posterior angles. Metathorax quadrangular, longer than broad, slight restriction behind the anterior angle; posterior margin with a narrow acute median angle on the abdomen; five hairs in posterior angles. Legs robust with short hairs on tibiæ and femora; pale with narrow dark borders.

Abdomen long and narrow, segments gradually widening to the fourth, fifth and sixth about equal, ninth deeply and angularly emarginate, the two acute points with one strong hooked hair; posterior angles of the segments with one or two long hairs; each segment with a broad transverse band darker on the median line and a dark brownish black lateral band.

From *Rallus virginianus* (Ithaca, New York).

Oncophorus bisetosus *Piaget*, Les Pediculines, 1880, p. 217, pl. XVIII, fig. 4; KELLOGG (var. *californicus* K. & C.) List, 1899, p. 65.

From *Rallus virginianus* (Ithaca, N. Y.). A variety of this form previously recorded from the same host (Palo Alto, Calif.). The specimens in hand much more closely approximate the type, but show certain slight differences.

Læmobothrum loomisi, sp. nov. (Plate III, Fig. 3.)

Description of female. Body, length 9.7 mm., width 2.58 mm.; clear pale brown with dark brown markings.

Head, length 1.46 mm., width 1.66 mm. ; large, broader than long, front margin truncate with many short and several longer hairs on the margin ; one short and two longer hairs in the rounding angle near the suture, a few long weak hairs on the dorsal surface of the front; the front half on the distinctly convex margin of the antennal fossa bears three long hairs and several short spines, and the hinder half is without hairs save one that arises on the ventral surface and extends beyond the margin, and a few short spines just in front of the eye; eye small and round, inconspicuous; temporal margins diverging in an even line to a rounding angle where they curve in to meet the concave occipital margin ; a series of six short stiff hairs on the front even margin of the temples; two long fine hairs in the rounding angle, two short spines just back of these, a single spine in the rounding angle of the occiput and temple ; antennæ concealed in fossæ ; labial palpi extending beyond the sides of the head nearly the length of three stout joints that are of nearly equal length, a short strong hair in the outer anterior angle of the third and fourth segments, color pale brown of the head, mandibles with dark tips on teeth ; darker marginal bands on each side of the front fading inwardly to the mandibles ; antennal fossæ rimmed with dark brown fading inwardly, lower inner half darkest brown curving in around the clear circular space through which the antennæ show; anterior margin of temples with a broad dark band, growing narrower on the posterior incurving margin of the temples ; occipital margin with a narrow dark band, a dark median blotch on the head between the temples ; posterior half of blotch broadly heart-shaped, anterior portion broad at median blotch but dividing into two narrow bands that diverge, growing pale as they approach the antennal bands, a clear uncolored circular space in middle of the blotch, and a clear V-shaped line about the posterior margin of the heart-shaped dark blotch.

Prothorax shorter than the head and not as wide as the head through the temples ; anterior portion narrow fitting into the occipital cavity, a distinct constriction abruptly separates this anterior portion from the posterior portion ; sides rounding, the posterior margin deeply emarginate, bearing the posterior angles as obtusely pointed, backward projecting processes overlapping the metathorax ; series of short stiff spines on the margin of the outer anterior half (of the front margin) of the prothorax, one long slender hair in the anterior angle, one long hair in the angle at the constriction and a series of about nine long hairs along the rounding lateral margins, four shorter hairs and a spine in the obtuse posterior angles; ground color pale brown, anterior margin with a narrow band of darker brown that disappears at the anterior angles, dark brown to black on the lateral margin darkest at the constriction and the angle immediately posterior to it, growing very narrow and lighter at the posterior angles and on the posterior margins ; a narrow uncolored median line extends the whole length of the prothorax with a pale brown band on each side, a narrow chitinous bar crosses the anterior half of the prothorax, meeting a broader lateral bar which curves inwardly from the anterior angle of the thorax, then down to the posterior portion where it curves in again to meet the narrow posterior brown band. Metathorax and mesothorax bell-shaped and continuous in outline with the abdomen, separated from each other by a distinct suture, anterior angles broadly rounding with two short hairs, sides gradually diverging, with a series of long and short hairs on the margin, posterior margin of metathorax with four long postulated hairs; the ground color as in the prothorax, the anterior and lateral margins with broad blackish-brown band from which incurving projections extend, one pointed blotch curves in from each anterior angle; the uncolored narrow median line extends through the meso- and metathorax, the dark band each side of this widens with a broad pyramid-shaped blotch on the mesothorax and diminishes again on the metathorax, though the anterior portion of the metathoracic blotch is much darker brown; sternal markings of prothorax dark median blotch, anterior two thirds quadrangular, slightly concave on anterior margin; posterior portion drawn out in a narrow neck, whole blotch looking like a flat-sided bottle; intercoxal lines dark brown. Metathorax with median markings oval with anterior and posterior ends narrowly drawn out; posterior portion of the oval supported by broad dark lateral bars, anterior portion with gracefully curved bars like handles to a slender-naked vase. Legs large and strong, covered with long hairs and short spines; pale golden brown with dark brown markings.

Abdomen elongate, oval, sides sub-parallel, widest at fourth segment, no distinct marginal constrictions between the segments, a series of long and shorter hairs along the lateral margins of the body and a series of long pustulated hairs on the posterior margin of each segment; last segment broadly rounded with a series of short marginal hairs and scattered dorsal hairs, color pale brown, dark brown lateral bands separated from the paler median portion by uncolored sub marginal lateral bands; the narrow median uncolored line of the thorax shows in the anterior portion of the first three segments of the abdomen; the anterior portion of the median transverse blotches of the segments is darker brown.

One specimen from *Anser albifrons gambeli* collected in San Francisco by Leverett M. Loomis, curator of birds, California Academy of Science. The largest species of Mallophaga so far known, exceeding the length of *Lipeurus ferox* (from albatrosses) by about .5 mm., and its width by about the same.

Trinotum luridum *Nitzsch*, Germar's Mag.. d. Ent., III, 1818, p. 300; KELLOGG, List of Mallophaga, 1899, p. 70.
From *Urinator pacificus* (California).

Ancistrona gigas *Piaget*, Les Pediculines, Supplement, 1885, p. 117, pl. XII, fig. 8; KELLOGG, List of Mallophaga, 1899, p. 71.
From *Puffinus creatopus* and *P. griseus* (California).

Colpocephalum maculatum *Piaget*, Les Pediculines, 1880, p. 516, pl. XLIII, fig. 1; KELLOGG, List of Mallophaga, 1899, p. 74.
From *Polyphorus cheriway* (Tampico, Mexico).

Colpocephalum funebre *Kellogg*, New Mallophaga, I, 1896, p. 147, pl. XII, fig. 7; List of Mallophaga, 1899, p. 72.
From *Larus glaucus* (California and Kadiak Island, Alaska).

Colpocephalum flavescens *Nitzsch*, Germar's Mag. d. Ent., III, 1818, p. 298; KELLOGG, List of Mallophaga, 1899, p. 73.

From *Haliætus leucocephalus* and *Aquila chrysætos* (Kadiak Island, Alaska).

Menopon infrequens *Kellogg*, New Mallophaga, I, 1896, p. 161, pl. XV, fig. 5; List of Mallophaga, 1899, p. 75.
From *Larus glaucescens* (California and Kadiak Island, Alaska).

Menopon funereum *Kellogg & Chapman*, Mallophaga from Birds of California, in New Mallophaga, III, 1899, p. 124, pl. VIII, fig. 6; KELLOGG, List of Mallophaga, 1899, p. 77.
From *Aphelocoma californica* (California).

Menopon kuwani, sp. nov. (Plate III, Fig. 4.)

Description of female. Body, length 2.22 mm., width 1 mm.; a very broadly oval body; color pale, translucent golden brown, without distinct markings, save almost circular ocular blotches of clear chestnut brown and dark tips of mandibles.

Head, length, .35 mm., width .65 mm.; broad through the temples, and sides curving evenly but rapidly to the slightly angulated front of the clypeus; one very short hair and one rather long and one shorter hair on the margin of each side of the angular point of the clypeus, a tiny prickle near the suture; two long and several shorter hairs on the swelling just in front of the very shallow ocular emargination; temples swelling but little below the ocular emargination, posteriorly forming a blunt angle with the occipital border which is concave; three long and two shorter hairs in the temporal angle and four long pustulated hairs on the occipital margin; color of head light-chestnut brown, with dark brown ocular blotches and black ocular fleck, dark chestnut markings where the tips of the mandibles show through the head; occipital margin with a narrow chestnut band, darkening into broad occipital blotches.

Prothorax bread, sides converging but slightly, anterior angles but little produced each with two short spines and a long hair; two long hairs and a short spine in the posterior angle and four long hairs on the slightly convex posterior margin; color pale even chestnut. Mesothorax short, sides rapidly diverging, metathorax distinctly separated from mesothorax by marginal constriction, but little wider than the prothorax; posterior angles with several short spines and the last of a series of long hairs on the posterior margin; color slightly paler than the prothorax. Legs of the palest color of the prothorax, and with several short stiff hairs on the femora and tibia.

Abdomen broadly elliptical, posterior angles projecting but little after the third segment, a few short spines and from one to two long hairs in the posterior angles; a series of long hairs on the posterior margin of each segment; last segment rounding with long hairs on the outer margin and a series of short stiff hairs along the rounding posterior margin; color paler than head and thorax but without darker markings.

From *Phalacrocorax penicillatus* (Calif.).

Menopon persignatum *Kellogg & Chapman*, Mallophaga from Birds of California, in New Mallophaga, III, 1899, p. 128, pl. IX, fig. 1;

KELLOGG, List of Mallophaga, 1899, p. 79.
From *Cyanocitta frontalis* (Mountain View, California).

Menopon mesoleucum *Nitzsch*, Germar's Mag. d. Ent., III, 181, p. 300; KELLOGG, List of Mallophaga, 1899, p. 78.
From *Corvus corax principalis* (Kadiak Island, Alaska).

Menopon alaskensis, sp. nov. (Plate III, Fig. 5.)

Description of female. Body, length 1.6 mm., width .6 mm.; general color, pale golden brown, with distinct dark brown ocular blotches.

Head, length .3 mm., width .45 mm.; semilunar with an evenly rounded front, distinct ocular emarginations, temporal margins narrowly rounding; occipital margin concave; a pair of short hairs near the middle of the front, a longer one on the side followed by a very short one, and then three longer ones in front of the emargination; ocular fringe composed of a few long hairs and short stiff hairs, and in the narrowly rounding temporal angles four long hairs and several short stiff ones; occipital margin broadly concave and with four long hairs; one long hair and two short ones on dorsal surface near anterior end of color blotches; dark brown to black ocular blotches (mandibles showing dark brown through the clear golden brown of the head), distinct black flecks in the eyes; a narrow dark brown occipital border broadening slightly each side of the median line.

Prothorax broad with lateral angles distinctly produced and bearing a long hair and two short spines, sides sloping rapidly to the flatly convex posterior margin, a short spine on the lateral margins and ten long hairs on the posterior margin; color pale golden brown with anterior angles darker fuscous; strong chitinous bars showing through body dark brown. Metathorax narrow anteriorly with rapidly diverging sides, a few spines on the lateral margins and a row of long hairs along the slightly convex posterior margin; mesothorax distinctly separated by a marginal constriction and a dark transverse line, a few strong spines and a long hair in the posterior angle and a series of long hairs on the posterior margin. Meta- and mesothorax with a broad, transverse fuscous band across the posterior half, and narrow darker lateral border; sternal markings composed of small median blotch on the prothorax with narrow darker lateral bars, dark inwardly curving intercoxal lines on the mesothorax, a broad median fuscous blotch on metathorax extending on to the first abdominal segment; many long hairs on the median blotches. Legs pale golden brown with darker brown markings, a number of short spines on the legs.

Abdomen elongate oval, posterior angles projecting but little, several short spines on the lateral margins of the segments with longer hairs in the posterior angles and along the posterior margin of each segment; last segment broadly convex with a series of fine short hairs, color pale golden brown with a broad fuscous, transverse band on each segment, a narrow darker lateral border and broad uncolored sutural lines separating the segments.

Many specimens from *Cinclus mexicanus* and *Pinicola enucleator* (Kadiak Island).

EXPLANATION OF PLATE III.

Fig. 1. *Nirmus luprepea* K. & C., female.
Fig. 2. *Lipensis comstocki* K. & C., female.
Fig. 3. *Læmobothorium loomisi* K. & C., female.
Fig. 4. *Menopon kuwani* K. &. C., female.
Fig. 5. *Menopon alaskensis* K. & C., female.

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COCCIDÆ FROM THE GALAPAGOS ISLANDS.

By S. I. Kuwana,
Stanford University, California.

(Plates IV and V.)

In 1898-1899 Messrs. R. E. Snodgrass and Edmund Heller, assistant in entomology and advanced student in zoölogy, respectively, in Stanford University, spent six months on the Galapagos Island collecting animals and plants for the University. The plants thus collected were placed in the university herbarium, and not until recently were they examined for Coccidæ. During the winter recess, December, 1901–January, 1902, the writer found six species of scale insects on these plants, representing four genera. All of these species are described in this paper. No previous records of Coccidæ from the Galapagos Islands have ever been published.

The following are the names of the species described in this paper: Subfamily Ortheziana, *Orthezia galapagoensis*, sp. nov.; Subfamily Asterolecaniinæ, *Asterolecanium pustulans;* Subfamily Lecaniinæ, *Lecanium hemisphæricum*, *Lecanium hesperidum pacificum*, var. nov.; Subfamily Diaspinæ, *Aspidiotus lataniæ*, *Aspidiotus smilacis*.

I have to thank Prof. W. R. Dudley for permission to examine the dried plants, and have also to acknowledge the courtesy of Prof. T. D. A. Cockerell in reading the MS. of this paper, examining specimens of the species herein described, and giving notes, published herewith, on these Galapagos Island Coccidæ.

This paper was prepared in the Entomological Laboratory of Stanford University under the direction of Prof. V. L. Kellogg.

Orthezia galapagoensis, sp. nov. (Plate IV, Figs. 1–4.)

Mature Female.—Antennæ 8-segmented, .76 mm. long, segment 8 longest, then 7, 6, 5, 4, 3 subequal, then 2 and 1, segment 1 being the shortest and thickest. Legs well developed; coxæ wider than long, stout; tibia longer than femur; tarsus one half the length of the tibia and tipped with a strong denticulate claw, which bears a spine at the base.

The body is an elongate oval, rounded, and covered with fine hairs; anal ring large, bearing six hairs.

The body is coated with a calcareous, laminated secretion. The shape and arrangement of this secretion cannot be given as the specimens were not in good condition. The length of ovisac, about 2 mm., length of insect, 1.6 mm.

Habitat: On *Cordea lutea* (821) and *Scalesia microcephala* (254), Tagus Cove, Albemarle Island.

"This appears to be close to *O. prætonga* Dougl., but the last antennal joint seems to be too long for that species. It cannot be satisfactorily identified without specimens showing perfect lamallæ of the secretion. I think it probable that this is a new species. "*O. ultima* Ckll., from the Argentine Republic, has the waxy lamellæ almost exactly as in the Galapagos species, so far as those of the latter can be seen. The legs and antennæ of *ultima* are much darker than the Galapagos species. The last antennal joint of the Galapagos species is very much longer than in *ultima*, and of quite a different shape. This joint of the Galapagos species is much nearer to *prætonga* than to *ultima*" (Cockerell).

Asterolecanium pustulans *Ckll.* (Plate IV, Figs. 5–11.)

Scale of female.—Test of adult female smooth, shining, hard, semi-transparent, flat beneath, convex above; oval in form, one end slightly tapering; color greenish-yellow; around the edge a fringe of long, pinkish-white, glassy filaments. Under the compound microscope the scale shows many glassy filaments all over the dorsal aspect. Average length, exclusive of fringe, about 1 mm.

Mature female.—Globular in outline, about .7 mm. in length; color red; antennæ and legs absent; margin of the body with a row of "figure-of-eight" glands in pairs; segments distinct; the posterior segment furnished with two lobes each bearing one long and two short spines; anal ring small with six hairs; mouth parts rather small, but well chitinized.

First larval stage.—Elongate oval, gradually tapering toward posterior extremity, flat; segments distinct; color red; mouth parts very large, rostral loop long; antennæ apparently 10-segmented, the last segment bearing long hairs: .08 mm. long, formulæ, 10, 2, 1, 6 (4, 7, 8) 9, 5, 3, 9); legs subequal, normal, tibia shorter than tarsus, digitules on tarsus fine, hair-like, knobbed, digitules on claw stout and short; posterior end of the body with two lobes, each bearing one long and two short hairs; anal ring bearing six hairs; length of body, .2 mm.

Pupa.—Length, .9 mm.; width, .4 mm.; reddish brown, antennæ and legs pale, antennæ long, reaching to the base of the second legs; wing-case large, reaching to the base of last leg; legs normal.

Habitat: On *Townefortia pubescens* (119), Iguana Cove, Albemarle Island.

"Quite the same as *A. pustulans*, and evidently introduced by man. The antennæ are not really 10-segmented; the apparent segments are rings; compare certain Aphids and Psyllids" (Cockerell).

Lecanium (Saissetia) hemisphæricum *Targ.* (Plate IV, Figs. 12–16.)

Mature female.—Length about 2.5 mm.; hemispherical in shape; color light brown. After treatment with KOH, the female becomes transparent with the exception of the margin of the body which is golden-yellow. Under the microscope may be seen many round, rather large pits all over the dorsal aspect; mouth parts small; antennæ 8-segmented, .14 mm. long, terminal segment bearing many long fine hairs, segment 3 longest, segment 1 next, then 8, segment 6 the shortest; the proportional length of antennal segments are as follows:

1	2	3	4	5	6	7	8
16	13	22	14	11	10	7	14
17	15	20	13	11	9	7	14

The three pairs of legs are subequal, strongly chitinized, coxa stout, longer than wide; tarsus shorter than tibia, digitules on tarsus fine and hair-like, knobbed; digitules on claw very large, of dumb-bell shape, and extending beyond claws; margin of the body with fine forked hairs; anal ring small with many hairs; anal plates small but heavily chitinized, bearing a few short hairs.

Habitat: On *Chicocca racemosa* (60), *Psychotria rufipes* (117) Tagus Cove, Albemarle Island and on *Polypodium squamatum* (499), Chatham Island.

"The scale looks like *Seissetia hemisphærica* Targ., and the antennæ and legs are not specially different. I think this is not to be separated from *S. hemisphærica*" (Cockerell).

Lecanium (Calymnatus) hesperidum *L.* **pacificum,** var. nov. (Plate V, Figs. 17–22.)

Mature female.—Length 2-3.5 mm.; color pale yellow: elongate oval in form, nearly flat, smooth. Under the microscope after treatment with KOH, the skin shows but very few pits, irregular in size and distribution. Antennæ 7-segmented, about .2 mm. long, segments, 4 longest, 3 next, 5 and 6 subequal and shortest, segment 1 thickest, wider than long, terminal segment bearing many long hairs, formulæ, 4, 3, 7, 2, 1 (6, 5). The proportional length of antennal segments are as follows:

	1	2	3	4	5	6	7
1	10	13	15	15	6	6	15
2	8	10	15	14	7	7	15
3	10	10	16	15	7	7	15
4	7	7	16	13	6	7	15
5		10	18	13	6	6	13
7		10	17	13	7	7	13

Margin of the body with forked hairs; each marginal incision has a large spine with a short one on each side; legs subequal, coxa large, longer than wide, trochanter triangular in form and bearing a long hair, femur large, convex on both sides, tibia nearly as large as femur, but slender, tarsus shorter than tibia, claw long and slender, digitules on tarsus long and hair-like, knobbed, digitules on claw stout, knobbed; anal ring small, with many (8?) hairs; anal plate bearing one large and two or more small spines at the posterior extremities.

Habitat: On *Achrostichum caudatum* (959), *Wedelia paludosa* (966), *Hibiscus tiliacens* (961), *Adiantum intermedum* (962), *Trichomanes prierii* (955), *Conostegia lasiopoda* (963), *Polypodium phyllitidus* (965), *Nephrolepis acula* (53), and *Alsophila armata* (964), Cocos Island. On *Psychotria rufipes* (817), Abingdon Island. On *Psychotria rufipes* (865), 1,000 ft., Iguana Cove, Abingdon Island, and on *Gossypium barbadense* (599), Seymour Island.

"This is a *Calymnatus*, very similar to *C. hesperidum*, but smaller than this species ordinarily is. The antennæ agree with *hesperidum*, as also do the legs. The insect is evidently ovoviviparous. The slight fimbriation of the tips of the spines is peculiar. *C. nanus* (Ckll.) from Trinidad, W. I., also has the spines occasionally slightly fimbriate, but it is a smaller species (length 1.5 mm.), and the fourth antennal joint is much shorter. I am by no means sure that the Galapagos insect is not a form of *C. hesperidum*, perhaps produced by climatic conditions" (Cockerell, MS.).

Aspidiotus (Hemibalesia) lataniæ *Signoret.* (Plate V, Figs. 23, 24.)

Scale of adult female.—The scale of the female is circular with the exuviæ laterad of the center; the position of the first is indicated by a ripple-like prominence, slightly covered with white cottony wax; the second skin is slightly reddish brown, with remainder of the scale slightly darker; the ventral scale is delicate, white, and adheres to the bark leaving a white spot when the scale is removed; diameter 1.7 mm.

Mature female.—The body of the female is ovate; pale in color, with the last abdominal segment lemon yellow, and presenting the following characters: there are four groups of spinnerets, the anterior laterals vary from five to seven, while the posterior laterals contain six; there is only one pair of lobes, they are very prominent, about as wide as long, notched on each side, and more or less rounded; there are two incisions in the thickening of the body wall laterad of the lobes; plates distinct, forked, about as long as the lobes; two laterad of the lobes, between the first and second spines, and three more between second and third spines; the spines distinct, first pair on the lateral margin of the base of the lobes, the second pair midway between the two incisions, and the third pair just laterad of the last incision.

Scale of male.—The scale of the male is oval in form, very much smaller than the female, but the same in texture; the exuviæ is near the center; length, about .8 mm.

Habitat: On *Scalesia hopkinsii* (851), 1,700 ft., Abingdon Island.

'Aspidiotus (Chrysomphalus) smilacis *Comstock*. (Plate V, Figs. 25–26.)

Scale of female.—The scale of the female is circular, or nearly so, slightly convex, with exuviæ laterad of the center, shining coal-black in color; the first skin shows no segmentation; length, .43 mm., the second skin oval, about .55 mm., in length; the color of scale grayish brown to dark brown; diameter usually 1.5–2 mm.

Mature female. The body of the female is ovate, lemon yellow in color; the last segment presenting the following characters: there are four pairs of well-developed lobes, the first and second lobes of each with a notch on the lateral margins, the third pair with two notches on the lateral margins, the fourth pair vary in shape, but are usually abruptly narrowed toward their posterior extremities on the lateral margins, and sometimes have notches; there are six thickenings of the body wall on each side of the meson, these are linear, oblong, with the anterior ends rounded and much expanded, and nearly parallel with the meson, one arising from the mesal margin of the first lobe is short and small, one from the lateral margin of the same lobe is more than twice the length of the lobe, one from the mesal margin of each of the second and third lobes is short and small, one from a point about midway between the second and third lobes extends anteriorly beyond any of the other thickenings, and finally one from the lateral margin of the third pair and one from the mesal margin of the fourth pair, are short and very small, between the members of the first pair of lobes and on each side between the first and second, and second and third lobes are two minute fringed plates, while the space between the third and fourth lobes is wide, with two rather large flat, fringed plates; the spines are very small, and are situated near the middle of the base of the lobes.

Scale of male.—The scale of the male is elongated oval, of the same general color as the female; ventral scale well developed and dark brown, about 1 mm., long.

Habitat: On *Croton scouleri* var. *albescens* (292), *C. scouleri* var. *macræi* (189) 4,000 ft., and *Chusques* sp., Tagus Cove, Albemarle Island; and on *Scalesia gummifera* (266), Elizabeth Bay, Albemarle Island.

"This is a *Chrysomphalus* presenting the closest possible relation to *C. smilacis* (Comstock) which I have not seen. *C. smilacis* was found at Wood's Holl, but I suspect it was on indoor plants. This species differs from *smilacis* in the form of the second and third lobes" (Cockerell).

EXPLANATION OF PLATES.

PLATE IV.

Orthezia galapagoensis, sp. nov.

Fig. 1. Antennæ of female.

" 2. Leg of same.

Fig. 3. Claw of the same.

" 4. Anal ring of the same.

Astero'ecanium pustulans (Ckll.).

g. 5. Last abdominal segment.
" 6. Marginal pits of the same.
" 7. Ventral aspect of first stage.
" 8. Antenna of the same.
Fig. 10. Last abdominal segment of the same.
" 11. Pupa ♂.

Lecanium hemisphaericum Targ.

Fig. 12. Antenna of the female.
" 13. Posterior margin of the female.
" 14. Pits of the same
Fig. 15. Marginal spines of the same.
" 16. Leg of the same; *a*, claw.

PLATE V.

Lecanium hesperidum L. var. *pacificum*, var. nov.

Fig. 17. Ventral aspect of female.
" 18. Antenna of the same.
" 19. Marginal spines of the same.
Fig. 20. Spines of the anterior incision.
" 21. Anal plate of the same.
" 22. Leg of the same; *a*, claw.

Aspidiotus lataniae Sign.

Fig. 23. Female; *a*, antenna of same.
Fig. 24. Ventral aspect of the last abdominal segment of the female.

Aspidiotus smilacis Comst.

Fig. 25. Female.
Fig. 26. *a*, *b*, ventral aspect of the last abdominal segment of the female.

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NEW SPECIES OF NOCTUIDÆ FOR 1902.

BY JOHN B. SMITH, SC.D.

This is the first of a series of descriptive papers based upon material that has accumulated in my collection or has been sent in by correspondents. As the drawers are rearranged from time to time the doubtful specimens are separated out until such period as further accessions definitely determine their status. Then descriptions are made as time allows and of those that are presented here, some were written five or six months ago.

It has not been until within very recent times that entomologists have appreciated fully the importance of accurate data concerning localities and dates of captures, and of good series of "common" species from all sections. Perhaps nowhere more clearly than in the Noctuids can formative species be studied when sufficient material is at hand. Species that have been in the past accepted as identical with European forms have shown, on closer study, divergencies that have authorized new specific names: varieties from other faunal regions within our own borders have shown constant characters that have made their real status a matter of serious question, and the collector who, now-a-days, fails to secure a good series of all the "common" species within his reach fails to grasp the opportunity to contribute towards an answer to the question, "What is a species?"

My greatest difficulty has been, of late, to get such "common species," for nobody has them in duplicate: and yet, in such types as *Agrotis* (*Noctua*) *rubifera*, *perconflua* and allies we find the influence of locality most strongly marked and the range of variation in maculation, as compared with sexual divergence most markedly illustrated.

In other words, one male and one female from any given locality may, but do not necessarily, illustrate a species. One hundred specimens of each sex may illustrate the species as it occurs in one locality, but they do not necessarily illustrate the range of the species. We have always admitted that genera were matters of individual opinion. I am not ready to say as much for species; but I do claim that we cannot say positively what is a species and what is a local variety until we have an abundance of material from each of the localities concerned. Furthermore, my studies seem to lead to the conclusion that there are very few species, comparatively, that occur unmodified in two or more real faunal regions. We may have closely allied, or representative species and we do undoubtedly have some widely distributed forms that hold their characteristics under the most divergent conditions; but as a rule specimens from well-defined faunal regions must be very closely compared before they can be said to be certainly the same.

Euthyatira pennsylvanica, var. nov.

In the course of a paper on the geographical distribution of North American Lepidoptera, Mr. Grote referred (Can. Ent., XVIII, p. 215) to a form of *Thyatira pudens* found in Anticosti. In a footnote he adds: "This variety is worthy of a distinct name, and in my second Check List of N. Am. Noct. (MSS.) I have called it *anticostiensis*. The moth is grayer, more hoary, the pink color has faded. Mr. Wm. Couper has taken this form on the island." In the text he refers to the matter in this wise: "From what I have seen I think that *Thyatira pudens*, found on Anticosti, has become grayer, the pink spots less vivid than on the mainland; the darkening by mixture of color, noticeable in polar species, has here taken place."

This is clear and there can be no sort of doubt of the character of the variation which Mr. Grote intended to name. I have seen just this sort of change in other species, but not in *pudens*. During the year or two last past, Mr. H. D. Merrick, of New Brighton, Pennsylvania, has taken a considerable number of specimens, to which, in some way, the name *anticostiensis* came to be applied. It differs from the type form in lacking the pink shades entirely, and in having the normal maculation more complete and more clearly written. The ground color is also richer and more intense than in the type form, so that, when I had only a single specimen I strongly suspected a new species. Mr. Merrick has taken so many examples however, in company with the normal form and under conditions which convinced him that copulation between the two had taken place, that the relation between the two remains hardly doubtful. It is certainly a strongly marked departure from the type and therefore entitled to a varietal name which I derive from the locality. It is of course probable that the same form occurs elsewhere, but its local abundance at this point deserves recognition.

Dates of capture range from April 29th to May 5th, and the species is thus an early flier.

Cyathissa pallida, sp. nov.

Ground color white with a faint creamy tinge. Head and thorax concolorous, the posterior thoracic tuft tipped with pale rusty brown. A short rusty basal streak, emphasized by a few black scales; but not prominent. Basal line marked by a few rusty costal scales only. T. a. line geminate, incomplete, rusty luteous, a little angulated below the cell, then almost evenly oblique to the inner margin: in the submedian interspace the inner line is emphasized by black scales. S. t. line not defined. The ordinary spots are not defined. The upper half of the median space is pale slate gray, and out of this shade is cut a large oblong white spot, extending from costa into the median cell and well defined by darker scales. A slaty gray shading also extends through the s. t. space, narrowly bordering the t. p. line to the angle, where the shade expands and extends to the anal angle, leaving free a semicircular area on the inner margin beyond the t. p. line: this area is faintly yellow-tinged. There is also a vague slaty shading within the excised outer margin below apex. Secondaries white, immaculate. Beneath white, with a vague creamy tinge along the costal area. Expands 1 inch = 25 mm.

Habitat.—Walters Station, California, in April (George S. Hutson).

Has the peculiar pallid desert appearance and is represented by one good female. It seems to be fully congeneric with the Texan *percara* and the type of maculation is identical; but this is a larger species and the color is totally different. There is no trace of green anywhere and, as the specimen was perfectly fresh when received and had not been exposed to light, I do not think there ever was any. It is an interesting occurrence and adds a mate to a species that has been long solitary in our lists.

Noctua spreta, sp. nov.

Size and form of *lubricans*, for which it is readily mistaken. The obvious difference is in the absence of all black markings on the collar. Ground color a fawn gray, with a variable admixture of reddish, changing the dominant tint. Basal line single, marked by a black bar across the costal region, then broken and obscure or altogether lost. T. a. line also single, variably indicated, sometimes lost, usually traceable below the median vein, never complete. T. p. line single, usually marked on the costa only, sometimes traceable for its full course as a smoky, evenly outcurved line which is a very little lunulated between the veins. The outer portion of the wing is usually a little darker, and in this the s. t. line may or may not be marked by whitish dots. So there may be also a blackish shading on the costa preceding this line. An obscure, lunulated, terminal line is indicated. None of the markings above described are prominent or contrasting, and all is obscure, powdery.

In some examples a reddish median line is traceable. Orbicular wanting. Reniform marked by black scales or small irregular spots; not outlined. Secondaries smoky in both sexes, darker in the female, a little paler basally. Head a little paler gray in front; sides of palpi blackish. Expands 1.30–1.50 inches = 33–37 mm.

Habitat.—Hastings, Florida.

Four males and six females from Mr. George Franck, in fair condition. The line of variation has been indicated, and the specimens before me range from almost immaculate to one in which all the described maculation is easily visible.

Feltia subgothica *Haw.*

The rearrangement of my Agrotid series brought to light certain examples from British Columbia, Vancouver and Washington, that did not appear to be specifically identical with the eastern form. The specimens ran larger, the markings seemed better defined and the reniform tended to become upright, not kidney-shaped or even oval. With this was also a more or less marked discoloration, the spot in some examples being of a uniform, discolorous, pale yellow. I suspected the latter of being *evanidalis* Grt., but the antennæ are not more obviously pectinated than in the eastern form.

Finally I wrote to my correspondents for specimens, and bought a lot from Mr. George Franck, so that I now have before me a series of over 100 selected examples ranging in locality from the Atlantic to the

Pacific, from Calgary, Alberta, to Hot Springs, New Mexico, and "Texas." I have none from any part of California, but have examples from Corvallis, Oregon; Seattle and Pullman, Washington; and several points on Vancouver Island.

I have arranged these again and again in different ways, using first one character and then another as basis, and have failed at last to convince myself that there is more than one species, though the extremes differ markedly. Nowhere, however, is there any tendency toward either *tricosa* or *herilis* and the validity of the species as distinct from them is abundantly confirmed. Neither antennal nor genitalic structure give us any assistance. There is a little difference, apparently, in the length or thickness of the former as a whole, and of the lateral processes of the joints, but not more than is within specific range. In fact, two specimens most nearly alike and from identical localities sometimes showed greater differences than the most unlike examples from opposite sides of the continent. The genitalic structure of the male is absolutely identical.

Taken as a whole examples from the Pacific Coast and from Calgary are larger and seem more robust, especially in the male. In my eastern series the males as a whole are smaller and slighter than the females. In the Oregon, Vancouver and Washington series the males were uniformly larger than the females. There are of course small males and large females, but the average is as I stated.

In the color of the secondaries the range is from almost uniform white to an even smoky black, in both sexes; though the females rarely have clean secondaries. All intermediate forms are found, from the narrow dusky margin to the complete domination of the darker color. The costa, subterminal and internal regions may be bright yellowish gray and contrasting, or they may be even, smoky, without any relief.

The orbicular varies little: it may be darker or lighter than the costa and may be rounded or angulated at the bottom. The reniform varies more, in color and in form As to form it is normally kidney-shaped, of moderate size and well proportioned. Sometimes it broadens and the outer margin becomes straight. Then it may narrow and the curves become intensified; or it may become upright, losing all curve, or becoming a long oval. Normally the spot is annulate with yellowish, the center reddish or brown, with a narrow, yellow, central line. This may become uniform, the central line being lost;

or it may become much more distinctly emphasized giving rise to greater contrast, or the entire center may be discolored, either reddish or bright yellow.

Altogether there is much more variation than in many other species that look less alike, and there is good evidence of a beginning racial separation. The simplicity and uniformity of the sexual structures tend to prevent fixity in such variations as do occur, and allow only such differences as the relative size of the sexes to become at all permanent.

Feltia edentata, sp. nov.

Has the general appearance and size of *tricosa* Lintner. Head smoky above, reddish-gray inferiorly. Palpi smoky at the sides. Collar smoky brown from base to a black line above the middle then with a whitish, brown and whitish line to the tip. Patagiæ gray, and brown mottled; disc of thorax brown, posterior tuft grayish. Primaries smoky brown, relieved by reddish-gray shadings as follows: over the subcostal vein to the cell, not involving the costa which remains smoky; over the median vein; over the claviform and below it to the s. t. line; and in the s. t. space. The veins are dark marked through this lighter shading. Basal and transverse anterior lines reddish-gray, slender, marked only through the submedian interspace. Transverse posterior line marked only by the contrast between the dark median space beyond the cell and the lighter subterminal space. Subterminal line marked by the contrast between the evenly dark narrow terminal space, and the paler subterminal space; not extending to the pale apex. A series of small black terminal lunules, beyond which is a yellowish line at the base of the fringes. Claviform long, extending almost across the median space, black margined, smoky filled, the smoky shade extending to the base and filling the submedian interspace. Cell before, around and beyond the ordinary spots, smoky. Orbicular V-shaped, open above, invaded by the reddish-gray shade on the subcostal, margined by a paler line. Reniform narrow, oblong, upright, a little wider above, outlined by a reddish-gray annulus, filled with rusty brown. Secondaries soiled yellowish white at base, darkening to a smoky outer border. A yellow line at base of fringes which are pale, with a smoky interline. Beneath, primaries smoky, becoming yellowish along inner margin; secondaries whitish, powdered along the costal region with a large apical cloud which is usual in this series. Expands 37 mm. = 1.50 inches.

Habitat.—Pullman, Washington, August 13.

A single male, found mixed with a lot of unspread specimens of *subgothica*. From that species it is at once separable by the lack of the dents or rays extending through the terminal space. It is thus in reality a nearer ally of *tricosa* Lintner. It differs by the dark costa, by the shape of the reniform and by the course of the transverse posterior and subterminal lines so far as these are traceable. The antennæ are quite strongly brush-like, the lateral processes from the joints quite long, the bristle tufting well-marked. In the actual arrangement of these tufts it is nearer to *subgothica* than to *tricosa*. It is probable that other examples occur, confused under another specific name.

Luperina trigona, sp. nov.

Ground color a dull, pale luteous, variably irrorate with deep smoky brown. Head and thorax concolorous with either the light or the darker parts of the wings. Primaries with costa, terminal space, and a broad band along the internal margin luteous, leaving a contrasting dark brown triangle which touches the outer margin only at the costa in the s. t. space. The median lines are lost. S. t. line marked by the contrasting colors, and by a series of darker, more velvety brown spots. A series of very small, powdery, blackish, interspacial terminal lunules. Median vein to the end of cell a little luteous. Orbicular small, variable in shape, luteous. Reniform moderate, upright, a little constricted, incompletely outlined, luteous, partly brown filled inferiorly. Secondaries pale luteous, the disk a little smoky in the female. Beneath pale luteous, disk a little smoky, all wings with a narrow darker lunule. Expands 1.60–1.80 inches = 40–45 mm.

Habitat.—Smith County, Tenn., August 6, 7, 21.

Two males and two females in fair condition only, of this remarkable species are before me, through the kindness of Mr. Stanley T. Kemp, of Elizabeth. It is allied most nearly to *passer*, but is a much more robust species. There is absolutely no danger of mistaking this species and that it should so long have evaded discovery I cannot understand. I know nothing of the country where it was taken or or the circumstances of its capture.

Hadena miseloides *Gn.*

In looking over a long series of specimens of this species to determine the range of variation to be represented in the collection, I noticed that certain Texan examples did not seem to fit anywhere satisfactorily, so, by the courtesy of Dr. Dyar, I secured such as were represented in the U. S. National Museum from that State; in all six specimens. All are females, unfortunately, and while their association with the normal form of the species is obviously indicated, they offer certain characteristic features that indicate a well-marked geographical race, at least.

Compared with a series of 15 female examples within the normal range of variation, the Texans ranged an average of 32 mm. in expanse against 34 mm. in the others. None of them had the brilliant mossy green powderings of the typical form. Two specimens had an obviously green shading, but much reduced in extent and not at all prominent. Two have no trace of green whatever and on two others it is reduced to mere indications. The ordinary markings, perhaps as the result of the more even color, seem to be more even and better defined; this is especially true of the median shade line. The s. t. line is more even, better defined, and in all cases there is an obvious terminal space not invaded to the margin by extensions from the s. t. space. A blackish bar extends from anal angle through submedian interspace almost or quite to the t. p. line. This is more or less indicated in some examples of the type form in a diffused shading which does not extend within the s. t. line. Finally there is a distinct bar from the end of the claviform to the t. p. line which is also diffusedly indicated in the type.

I do not think we have to do with a good species here; but it is a well-marked geographical race which deserves a name that it may receive further attention from collectors. As such I propose the term *Hadena miscellus*. Two examples only have definite localities; Waco, Texas, September 1; Blanco County, Texas, no date; two others are from Belfrage, May 4 and April 20. The others are marked Texas only, without other indication.

A good series, including males would be very desirable.

Hadena macerata, sp. nov.

Resembles *miseloides* in wing form, type of maculation and general coloration. Head mottled with green, yellow and blackish scales. Collar deep brown at base, mossy yellowish green above, a blackish line through the center of this shade. Thoracic disc mottled with greenish-yellowish, white and black, posterior tuft yellow tipped. Abdomen smoky gray, tufts prominent and more ashen gray. Primaries irregularly mottled with mossy yellow and greenish scales, the former predominating; all the ordinary markings broken and obscured except for the very large, white reniform. The basal line extends across the wing, is geminate, broken, best marked on the submedian vein where a black tooth is sent in to the base from the inner part of the line. T. a. line so badly broken as to be obscure, but as a whole it is a little outcurved. T. p. line geminate, outer line broken, obscure, gray; inner line black, less broken; somewhat squarely exserted over the cell thence rather evenly oblique to the inner margin. The space between the median lines is the darkest part of the wing, becoming blackish below the cell and between the ordinary spots, while costal region and internal margins are mottled. On the costal region a black median shade is clearly marked, extending obliquely between the ordinary spots, angled below the reniform, thence direct to inner margin where it again becomes obvious. Claviform small, pointed, black, a black shade extending from it through submedian interspace, to t. p. line. Orbicular oval, oblique, annulate with white, mossy filled, variable in size. Reniform large, subquadrate, the angles rounded, contrasting white. S. t. space with grayish rays extending from t. p. line toward outer margin; in part met by similar rays from outer margin, breaking up the space into more or less complete oval blotches. No complete s. t. line, and only indications are found of what normally occurs. Fringes brown, cut with whitish on the veins. Secondaries smoky, tending to become paler toward base. Beneath powdery; primaries smoky on the disc, terminal space paler, a broad blackish cloud at middle of costa and a broad, powdery, obscure extra-median band. Secondaries paler with broad inner and extra-median powdery blackish bands and a discal spot. Expanse, 32 mm. = 1.28 inches.

Habitat.—Cartwright, Manitoba, July 11; Winnipeg, Manitoba, July 7.

Two females from Mr. Heath and Mr. Hanham, respectively. They resemble a very much mottled *miseloides* and so I took them to be when first received. Comparing with a large series of the old species, however, showed that this was a specific character, emphasized by the absence of the s. t. line and other minor features. It is probable that the white contrasting reniform may be absent in some examples as it is not infrequently in *miseloides*. It is another of those cases of a representative species of which we have had so many of late years from this same locality.

Hadena unicincta, sp. nov.

Ground color bluish ash gray, with blackish powderings, the veins of primaries all blackish. Head and thorax concolorous, patagiæ a little smoky at the base of the wings. A distinct, slender black streak extends from the base through the submedian interspace to the transverse anterior line. T. a. line marked only by a geminate lunule between internal vein and inner margin. Transverse posterior line single, black, obscure over the cell where it is squarely exserted, well marked below vein 2 to the inner margin, rigid, followed by a white shade. This is the most prominent bit of wing ornamentation and gives the name to the species. S. t. line practically obsolete. A broken blackish, terminal line. Claviform large, broad, concolorous, outlined by a distinct narrow black line which is not entirely complete. Orbicular large, oval, oblique, almost or quite touching the reniform inferiorly, narrowly black ringed, whitish filled. Reniform moderate in size, kidney-shaped, outwardly not defined, inwardly well margined by a black line, whitish filled, but merging outwardly into the ground. Secondaries even, smoky pale gray, with a tendency to white at the base. Beneath, pale gray, powdery. Expands 37 mm. = 1.50 inches.

Habitat.—Soda Springs, August 27, California; Sierra Nevada, California, two female examples.

The specimen from Sierra Nevada is type No. 4949 of the U. S. National Museum, and both came through Mr. Henry Edwards, years ago and at quite different times. It is a well and simply marked form which is not easily mistaken. In its wing form it is allied to *diversicolor* Morr., the type of maculation being also similar, or yet more nearly like *claudens*. In the absence of a male it is not possible to say with certainty that the insect does not belong with *Xylophasia*, but I deem it unlikely.

Mamestra circumvadis, sp. nov.

Ground color white, mottled or overlaid by grayish-yellow or olivaceous shades and tints. Front of head and sides of palpi brownish ; vertex white, a black line between the bases of the antennæ. Collar white, with a luteous band near tip and some black scales laterally. Thorax white, speckled with olivaceous: dusky line behind the collar, a similar line on the disc of the patagiæ and at the base of the wings. Abdomen smoky. Tarsi obscurely white ringed. Primaries somewhat blotchy in appearance, but with all the normal maculation present and well defined. Basal line geminate, the inner portion black, outer brown, lunulate in the interspaces : continued below the median vein by a subquadrate black spot above and a curved black mark below the internal vein. The basal space is mostly whitish, but becomes olivaceous toward the t. a. line. T. a. line geminate, nearly upright, a little outcurved in the interspaces, the outer portion black in the cell and in the submedian interspace; obscure below the internal vein, where the margin is whitish almost to the anal angle. T. p. line geminate, squarely exserted over the cell, inwardly oblique and a little incurved below : inner line black, lunulate, the points well marked on the veins. The median shade line is marked on the costa between the ordinary spots, below which it runs close to the t. p. line ; visible only in the pale areas of the median space which are just below the cell and along the inner margin. S. t. line white, a little irregular, edges not sharply defined, preceded by prominent, sagittate black spots in the third, fourth and fifth interspaces. Lower part of the s. t. space whitish. Terminal space evenly olivaceous gray. A series of small black, interspacial, terminal lunules, beyond which the pale interlined fringes are cut with brown. Claviform short, broad, incompletely outlined by black scales. Orbicular large, nearly round, white, with a diffuse luteous gray center. Reniform large, wide, broadly white ringed, the center somewhat paler than the rest of the dark wing shading. Secondaries smoky, blackish, paler at base, with an extra-median dark line, a vague discal lunule and white interlined fringes. Beneath with an almost uniform smoky suffusion over a white base : an outer transverse line and a discal lunule being more obvious on the secondaries. Expands 1.36 inches = 34 mm.

Habitat.—Head of Pine Creek, Calgary, Alberta, July 21, 1900, Mr. Dod (No. 31).

This striking species was first sent me by Mr. Dod in December, 1900, and was returned to him as probably new. It was again sent me in 1901, still unique, and is now described from the female only—a fine, almost perfect example.

This species is robust, with quadrate heavy thorax, short triangular wings, and is allied to *chartaria* and *defessa*.

Mamestra vau-orbicularis, sp. nov.

Ground color an obscure, gray, luteous brown, with smoky and blackish shades and powderings. Head with the vertex a little darker. Collar with a broad, dusky, median transverse band. Thorax with patagiæ scantily powdered with blackish scales. Abdomen uniform, only a little paler than general ground. Primaries with all the ordinary maculation present but, except for the ordinary spots, not contrasting or prominently defined. Basal line geminate, blackish, with a sharp outward angle on the subcostal. On the internal vein, just beyond the termination of the basal line, is a black spot which extends obliquely upward toward the costal inception of the t. a. line; but is diffuse and becomes lost in the cell. T. a. line geminate, almost evenly oblique outwardly. The component lines are slender, the outer blackish and marked by a larger spot on costa, scarcely complete; the inner is hardly defined except on costa, and by the somewhat yellowish included space. T. p. line geminate, only a little outcurved over the reniform and then almost evenly oblique to the inner margin. The inner line is blackish, slender, crenulate; the outer is composed of black, followed by yellowish venular dots. The included space is yellowish. Median shade broad, diffuse, smoky, outwardly oblique from costa between the ordinary spots, involving the reniform inferiorly; thence inward, parallel with and close to the t. p. line, to the inner margin. S. t. line yellowish, very even except for a jog on vein 7, emphasized by preceding, diffuse blackish spots. A series of small, black, terminal lunules. Fringes yellowish, with a smoky interline. Claviform wanting. Orbicular small, concolorous, open above, outlined by a black V, which forms the most prominent feature in the maculation. Reniform upright, long, narrow, somewhat crescent-shaped, incomplete above and below, the sides with a black margin, within which is a narrow yellow line. Secondaries dull smoky fuscous, a little paler and more transparent at base. Beneath, smoky with a yellowish tinge, powdery, with a common outer line which is incomplete on the primaries, and a discal spot which is well marked only on the secondaries. Expands 1.40 inches = 35 mm.

Habitat.—Corvallis, Oregon, June 21, 1900, Professor Washburn.

A single male in good condition. The antennæ are feebly ciliated only. The legs are densely clothed with long, divergent scales; but there appear to be no true tuftings. The species belongs with *noverca* and *goodelli* in type of maculation; but it is larger and more robust than either. The thorax is quadrate, the vestiture rather loose, the divided crest and the patagiæ are both well marked. At first sight the species recalls an *Hadena* of the *binotata* series, but the eyes are obviously hairy. The characteristic V-mark will serve to identify the species readily.

Oncocnemis balteata, sp. nov.

Head gray; white with black scales intermixed: a blackish line across the front, another between the antennæ. Thorax rusty luteous, with white scales intermixed: collar with alternating black and white lines, tipped with luteous. Primaries rusty luteous at extreme base, darkening rapidly to a smoky brown which extends to the middle of the wing. This is followed by a broad whitish band, which outwardly merges through luteous into a dark, smoky, terminal space. The ordinary maculation is more or less clearly marked in all these spaces. Basal line geminate, marked across the costal region only. T. a. line geminate, dark smoky, a little oblique and with small outward bends in the interspaces. T. p. line geminate on costa only, thence narrow, single, broken, luteous, squarely exserted over the cell and deeply incurved beneath. This line runs entirely through the white area and is not at all well-marked. S. t. line very close to the outer margin, broken, very irregular, marked partly by white scale lunules, partly by preceding or following irregular black spots. A broken, black terminal line. Fringes brown at base; outer half alternately cut with brown and white. Claviform a very small black loop, filled with white scales. Orbicular small, round, black ringed, with a white inner annulus and a small brown central dot. Reniform rather large, kidney-shaped, very imperfectly outlined by luteous scales, the whole macula being included in the white band. Secondaries white, a little luteous at base, with a broad black marginal band and white fringes. Beneath white with a broad black marginal band. Primaries smoky in the costal region and toward base: fringes interlined and cut with black and white. Secondaries black-powdery on costa toward base, with a small black discal dot and with white fringes. Expands 1 inch = 25 mm.

Habitat.—Poncha Springs, Colorado, August 14th, Oslar.

One male in good condition. It belongs to the *levis* series, in which the fringes are long and the outer black band of the secondaries is defined. When spread there appears a continuous white band across both wings somewhat as in *fasciata*; but this is a smaller species and quite distinct.

Oncocnemis regina, sp. nov.

Head, thorax and primaries very pale ashen gray with a yellowish tinge. Head and base of collar with a somewhat reddish shade, the thoracic parts speckled with black scales. Primaries with all the maculation present, but with a washed-out, faded, powdery appearance. Basal line feebly traceable, single. T. a. line single, narrow, brown, even, with an even outcurve. T. p. line blackish, single, irregularly dentate, broadly outcurved over the cell and a little incurved below; followed by a creamy yellow shade which is the palest portion of the primary. Through the center of the wing is a broad, vague, diffuse brown band. The s. t. line consists of yellowish preceded by blackish scales, which emphasize the line and then fade into the s. t. space, which, as a whole, is darker than the terminal space. The latter is a very finely powdered creamy gray. Fringes yellowish, with brown lunules opposite the veins. Claviform wanting. Orbicular round, moderate in size, with a broad yellowish annulus; the center of the ground color. Reniform moderate in size, broadly kidney-shaped, yellow, with a central darker shading. Secondaries washed-out yellow, with a broad black border, the fringes yellow. Beneath, both wings yellow, with broad black borders and yellow fringes. Expands 1.12 inches = 28 mm.

Habitat.—Regina, N. W. T., 1886, Dr. James Fletcher.

A single male, in poor condition, but with the wings of one side nearly perfect. I have had it in my collection for years, awaiting a mate; but up to the present time none has appeared. The species is much paler and has a more faded, washed-out appearance than any other of the yellow-winged forms.

Helotropha obtusa, sp. nov.

Dark smoky brown, almost blackish Antennæ whitish above, distinctly reddish below. Head and thorax concolorous save that the tips of collar and thoracic tuftings are somewhat lighter brown. Abdomen uniformly smoky Basal line obscurely marked, consisting of a very narrow black, preceded by an equally narrow pale shading. T. a. line geminate, well removed from base, outwardly oblique, even, the inner line narrow, black, the outer lost in the black median space. T. p. line geminate, even, obtusely curved over cell, then evenly oblique below, to the hind margin close to the point reached by the t. a. line. The median space is thus V-shaped and this is black or blackish-brown below the median vein; towards costa and in the cell where it is broken by the ordinary spots the shade lightens a little, but continues darker than the rest of the wing. S. t. line very narrow, rivulous, composed of whitish scales, more or less relieved by dusky preceding and following shades. Apex gray powdered. A series of black, interspacial terminal lunules. Fringes smoky brown, with a yellow line at base, and cut with yellow opposite the veins. A very short, broad claviform is outlined in black scales. Median vein marked with pale scales through the dark median space, and these scales are continued on veins 3 and 4 from the forking to the s. t. space. Orbicular small, oval, oblique, of the ground color, very narrowly outlined by pale scales. Reniform upright, inferiorly dilated and indefined, of the ground color, defined by a very narrow pale line except as above stated. Secondaries dark smoky, a narrow extra-median line and a discal lunule being faintly traceable. Beneath smoky, very powdery. with a large discal spot and sometimes an extra-median line on the secondaries. The primaries in one case have also a vague discal spot. Expands 1.12-1.32 inches = 28-33 mm.

Habitat.—Ashleys Ferry, Claremont, N. H., August 17, 1901, September 3, 1900, Mr. Foster.

Three males and one female, the former the smaller examples, none of which are really good.

The species is so utterly unlike any other known to me that I suspected a foreign origin when the first example came into my hands. It is perhaps questionable whether the species can remain in *Helotropha;* but the peculiar type of maculation allies it to *Euplexia*, which it also resembles in wing-form, while in other respects the structural details point to *reniformis* which is resembled by the new form in the shape of the ordinary spots and the whitish markings of the median vein and its branches.

The specimens were communicated by Mr. F. H. Foster.

Eucalyptera strigata, sp. nov.

Ground color creamy white or yellowish, varying a little in tint, and variably black or brown speckled. Head below the frontal tuft, the sides of the palpi and the anterior legs deep brown. Primaries with a broad somewhat diffuse blackish streak through the center of the wing, not quite reaching the base and usually fading out just short of the outer margin. Two small black points indicate the ordinary spots.

T. p. line indicated by a curved series of smoky venular points. A series of smoky, terminal, interspacial marks. The brown or blackish powdering on the primaries tends to darken the apical and terminal regions of the wing. Secondaries paler creamy, tending to dusky toward the apex. Beneath yellowish, primaries with a variable smoky suffusion; either a vague reproduction of the upper striga or involving the entire disc. Expands .90–1.30 inches = 23–32 mm.

Habitat.—Hackley, Texas, May 29; September 1–10.

Three males and six females from Mr. George Franck, who has others. The collector and the conditions under which they were collected are unknown to me. The species differs obviously from the other described forms by the continuous central streak and punctiform t. p. line. The males are smaller throughout and have the antennæ lengthily ciliated. The females vary more than the males, not only in size, but in relative distinctness of maculation. In the series before me the smallest female is as large as the largest male.

Platysenta albipuncta, sp. nov.

Resembles *videns* in appearance, but is paler, not so reddish, not so glossy in appearance and is more contrastingly marked. General color a faintly-reddish gray, more or less powdered with black. Head irrorated with white scales. Collar more or less obviously tipped with white scales. Disc of thorax with a slight admixture of whitish scales, giving it a hoary appearance in good specimens. Primaries with a diffuse, blackish, powdery shade extending over the median vein, to or beyond the t. p. line and, in some specimens, expanding so as to take in the darker terminal space. In this dusky shading which is the dominant feature of the maculation, the orbicular is variably indicated. Sometimes it is scarcely traceable; sometimes a narrow circle of white scales; sometimes a concolorous disc of the ground color without powdering, and this may or may not have a smoky center. The reniform consists of a prominent white spot at the lower outer angle of the median cell, supplemented by scattered white scales superiorly. T. a. line is completely traceable in one example as a narrow, broken, outcurved, interrupted smoky line; but is more usually indicated by venular dots or is entirely wanting. T. p. line is a curved series of venular blackish dots, followed and sometimes preceded by white scales. This also varies in distinctness; but is always traceable and usually obvious. The veins here are also more or less speckled with white scales giving a somewhat hoary appearance. The veins are otherwise smoky, darker outwardly. A black terminal line, and from this a dusky shade may extend inwardly a variable distance. Fringes smoky or blackish, narrowly cut with white and with a white dot at the base on the veins. Secondaries, white in the male, or little yellowish soiled in the female, outer margin narrowly dusky, broader on costa. Beneath, primaries gray, powdery, with a more or less obvious smoky outer line. Secondaries powdery along costal margin only, and with a small discal dot which may be wanting. Expands 1.12–1.25 inches = 28–31 mm.

Habitat.—Harris Co., Texas (Franck); Colorado Springs, VIII, 5, Colorado (Oslar).

Nine examples all males, and all save one from Texas. The specimen from Colorado Springs has been in collection for some time and was associated with *videns*. To the latter the new species is really very close and, without so many examples of both forms as are before me for comparison, I would hesitate about making the separation.

Tæniocampa alurina, sp. nov.

Ground color of the usual dusty fawn brown, resembling *alia* at first sight and referable to the same group. Head and thorax concolorous. Antennæ of the male with short lateral processes, scarcely to be called pectinations yet more than the lateral projections present in *alia*: the processes bristled as usual.

Primaries sparsely powdered, less irrorate than *alia*, the median lines single and fairly marked. Basal line present, single, smoky, not prominent, very close to the root of the wing. T. a. line smoky brown, single, a little diffuse, only a very little outcurved. T. p. line single, smoky brown. quite well marked, a little outcurved over the reniform, a little incurved below. On close examination it is seen that this line is very finely crenulate, with small black dotlets on the veins; but the crenulations are filled in by the smoky shade so that it appears as a single, rather thick smoky line. S. t. line narrow. yellowish, irregular, fairly complete in two out of the three examples before me, preceded by a variable s. t. shade which may have a tinge of red. A series of smoky interspacial terminal spots which may be distinct or barely traceable. A diffuse median shade darkens the reniform and may or may not cross the wing. Orbicular round or nearly so, concolorous, obscurely defined by a very narrow slightly paler ring. Reniform moderate in size, only a little excavate outwardly, narrowly outlined in yellowish, darker than the ground. A somewhat reddish shade over the cell. Secondaries a paler reddish-gray, smoky outwardly, with a vague discal spot. Beneath reddish-gray, powdery; with a variably complete outer common line and a discal spot on each wing. Expands 1.30–1.45 inches = 33-36 mm.

Habitat.—Near Chicago, Illinois, April 27, 28, A. Kwiat.

Three male examples sent in by Mr. Kwiat and representing all his captures. Two of the examples are dated in 1900 and are very much alike; the third is dated in 1901 and resembles *alia* more closely than either of the others. Had I received this example first, I would probably have put it down as being a slight variation of the common form.

Compared with *alia* it is less powdery; it is somewhat smaller, the median lines obvious in all cases, which is contrary to what occurs in *alia*. Finally, the genital structure of the male is distinctive, resembling the European *incerta* more than the American representative. The harpes are broadly oval, the tip evenly rounded; clasper single, long, very stout, sharply drawn out at tip, strongly curved, without an accessory process at base. Compared with the figures given in my revision of *Tæniocampa*, the differences pointed out will appear obvious.

It is not improbable that examples of this species may be confused with *alia* in collections from the same faunal region.

Podagra, gen. nov.

Eyes naked, hemispherical, not prominent. Antennæ in both sexes simple. Head moderate in size, the front protuberant a trifle excavated centrally, with a small conical median process and yet smaller lateral projections. Palpi small, not exceeding the front; terminal joint small, obtuse. Vestiture scaly. Thorax with the patagiæ marked, a little uplifted. Legs moderate except the anterior, which have the femora and tibiæ enlarged or dilated. Posterior tibiæ with a few spinules between the usual spurs; median moderately spinulate throughout; anterior somewhat abbreviated, inflated and with the upper surface closely set with prominent, stout spines which are long, equal in diameter and bluntly terminated. Primaries trigonate, costa obviously depressed beyond the middle, apices well marked, outer margin evenly rounded, the fringes a little dentate opposite the veins.

The genus is unique in the armature of the fore tibiæ, and should be readily recognized.

Podagra crassipes, sp. nov.

Ground color of head, thorax and primaries a pale ashen gray with a clay yellow or reddish-yellow shading. Head and collar luteous or pinkish. Head in front and sides of palpi with black powderings. Thorax with black powderings which are massed on the patagiæ, on the posterior tuft and, to a less degree, on the disc. Abdomen evenly creamy yellowish. Primaries more or less black powdered, with the luteous or pinkish tinge dominant in the basal and terminal spaces and longitudinally through the center of the wing. Basal line wanting or barely indicated on the costa only. T. a. line broken, incompletely geminate with a long outward tooth in the submedian interspace; almost or quite meeting a similar, inward tooth from the t. p. line. T. p. line geminate, even, broken, well outcurved over the cell, incurved below, with a more or less well-marked inward tooth to meet that of the t. a. line in the submedian interspace. The outer portion of the line is most obvious and, next to this, is the pale included space; the inner line being chiefly defined by the slight color contrasts. Except through the cell the median space is blackish, powdered. S. t. space blackish, powdery except opposite the cell. S. t. line black, broken, emphasized on the veins which are sometimes black spotted, as a whole almost evenly oblique. Terminal space evenly tinged or with only the veins marked with black scales. A series of black, terminal, interspacial lunules, beyond which the whitish fringes are cut with black. Orbicular a small black dot which is sometimes wanting. Reniform wanting or very obscure, marked by two minute black dots or by a vague paler shading which has no definite outlines. Claviform wanting. Secondaries white in both sexes, with a smoky powdering over the veins outwardly and with an indefined, powdery discal lunule. Beneath white, more or less powdery: primaries tending to a pinkish shading, a smoky disk and a blackish costal shade at the s. t. line. All wings with a blackish discal lunule. Legs gray or blackish, ringed with whitish. Expands .95-1.06 inches = 24-27 mm.

Habitat.—Quartzsite, Yuma County, Arizona, in March; Walters Station, Colorado Desert, California, April 20 (George S. Hutson).

Three males and four females in good condition and very much alike. It is a typical desert species with the peculiar reddish suffusion over a gray base and a powdering of black scales over all. I know of nothing that resembles it closely in appearance and certainly nothing that has the same generic characters.

Crimona, gen. nov.

Eyes naked, hemispherical, of good size. Head will developed, not prominent; front protuberant, roughened, vestiture flattened hair and scales, projecting straight forward. Palpi not extending beyond the front. Tongue strong. Antennæ in the ♀ simple—male not at hand. Tibiæ not spinose; anterior short, broad, corneous, with a single, median, claw-like process; median normal; posterior leg aborted, not more than half developed. Vestiture flattened hair and scales; patagiæ marked, thorax quadrate, a well-marked posterior tuft. Abdomen with small dorsal tufts on the basal segments. Primaries trigonate, costal margin nearly straight, apices well-marked, outer margin very oblique, arcuate, with long fringes.

Resembles *Oncocnemis* somewhat in appearance, but differs in the abbreviated fore tibiæ and in the protuberant, rough front. The hind legs are abnormal in their development, and this feature may be accidental in this example; but otherwise the insect is perfect, and the degeneration is perfectly symmetrical. The genus seems not to conflict with any other known to me.

Crimona pallimedia, sp. nov.

Ground color a light mottled luteous, varied with ashen gray. Head and collar pale luteous, with an admixture of white and black scales; the latter more numerous at the base of the wings. Patagiæ gray, the disk rather well powdered with black scales. Thorax centrally luteous, the posterior tuft gray, black powdered. The small abdominal tufts gray, else that part is very pale yellowish. Primaries with basal space luteous, a little streaky, the yellowish shade narrowing toward the center of the wing, but cutting the median space and expanding into the s. t. space which is completely filled. Basal line wanting. Median lines interrupted. The median space forms a somewhat elongate, trigonate gray patch on the middle of the inner margin, and a much larger, triangular, gray area on the costa. These areas are limited by narrow black lines. Orbicular oval, whitish, with gray center, partly undefined. Reniform large, kidney-shaped, outlined by a narrow black line, pale, with a gray, powdery center. The terminal space is very narrow, gray, preceded by a pale diffuse s. t. line, which is inwardly bordered by a darker luteous shading. A black terminal line, more or less broken on the veins. The fringes mottled, ashen gray. Secondaries whitish at base, darkening to a smoky extra-median shade: beyond that is a whitish area which in turn darkens to a smoky border, sharply limited by a black line at the base of the white fringes. Beneath white, with a broad blackish extra-median shade band, and discal spots on both wings. Primaries blackish powdered on costal area. Expands 1.12 inches = 28 mm.

Habitat.—Walters Station, California, in April (Geo. S. Hutson).

This is a desert species, represented by one female only. It has somewhat the wings form of *Fala ptycophora* and belongs to the same general series with that species. The insect is peculiar in the cutting of the median space, by which the basal and s. t. spaces are connected. I know of nothing resembling it nearly enough to cause confusion.

Oxycnemis fusimacula, sp. nov.

Ground color bluish ashen gray, more or less black powdered. Antennæ black and white ringed. Head and thorax evenly black-speckled, the posterior scale tuft more blackish at tip. Primaries with the maculation neatly defined, but with a streaky appearance due to the fact that the veins are generally marked with white scales in the darker areas and with black scales in the paler areas. Basal space paler than the rest of the wing. Basal half line black, single, sometimes obscured. T. a. line single, slender, black, with a prominent outward angulation centrally, and an outward bend below the internal vein. T. p. line slender, black, its inception on the costa obscured by a white and black streaking, inwardly oblique, with a somewhat abrupt though slight incurve below the cell. S. t. line is a diffuse whitish shade from the apex to the anal angle, irregular and variably defined. An incurved blackish shading starts from the costa within the apex, crosses the t. p. line, outwardly marks the reniform and ends on the median vein: forming the most prominently contrasting feature of the wing. There is a black terminal line, and the long, gray fringes are narrowly cut with white opposite the veins. Claviform white-ringed, paler than ground, extending from the angle of the t. a. line nearly or quite across the median space, the pointed tip often touching the t. p. line. The ordinary spots are fused and margined by a narrow white line which, at the upper angle of the reniform breaks into a series of white rays extending to the costa inside of the curved blackish shade already described. Secondaries white at base, becoming smoky outwardly, more so in the female, the veins a little soiled. There is a smoky terminal line and the fringes are somewhat marked with smoky. Beneath, primaries blackish, the fringes prominently cut with black and white. Secondaries white, a little powdered over costal region. Expands .90–1.00 inch = 23–25 mm.

Habitat.—Quartzsite, Yuma Co., Arizona, in March; Walters Station, California, in April (George S. Hutson).

One male and seven females in good condition; all desert collections. The species is close to *advena* Grt.; but that species has the t. a. line upright and the ordinary spots subequal, with included dots. The prominent angle in the t. a. line of the new species and the long, fused, white-ringed ordinary spots, will form good distinctive characters. The dark subapical shade is the most obvious feature and quite characteristic. There is very little variation in the series before me—being all a matter of a little more or a little less in some one or more unimportant features.

Acontia *Ochs.*

Since my Revision of the species of *Acontia* only a little over a year ago (Trans. Am. Ent. Soc., XXVII, pp. 47–84, September, 1900) I have received much material for determination and otherwise. This has served to complete sets and to confirm identifications made. It has also disclosed the existence of four heretofore undescribed species three of which are here characterized. Of these one, from Lake Worth, Florida, is due to the untiring work of Mrs. Slosson, who has discovered so many interesting species in her favorite localities. The others are from the Southwest. With one exception the examples described were taken by Mr. George S. Hutson on a prospecting trip across the desert from Yuma County, Arizona, to San Bernardino County, California. Exact localities are not available; but those marked Quartzsite, Yuma County, Arizona, were taken not far from that camp, while those marked Walters Station, California, were taken nearest to that place. In each case the territory was similar, except in elevation, and quite a number of the species from both localities proved identical. The character of Mr. Hutson's sendings indicates the existence of a series of species of which we have thus far only the merest fragments.

Acontia niveicollis, sp. nov.

Head except extreme base, slaty gray. Collar white at base like the head, else like the thorax, which is a glistening smoky or slate gray, verging toward deep chocolate brown. Abdomen smoky brown above, white beneath. Primaries white, mottled with slate gray. The white area extends along the costal area and through the cell to the reniform, broken by a slaty costal spot at the place of the t. a. line. Below the median vein the wing is slaty gray or blackish to the t. p. line; broken by a white transverse line representing the pale included space of the t. a. line. Above the reniform is a small, quadrate slaty spot, from which the dark gray t. p. line curves over the cell and forms the apparent outer margin of the reniform. The orbicular is a small black dot. The reniform is a dark, slate gray, round spot of moderate size, surrounded by a well-defined white annulus and incompletely gray margined without that. There is a quadrate white spot on the costa beyond the t. p. line and from the dark shade which limits this outwardly, arises a slender broken line of gray scales, parallel to and forming the outer part of the t. p. line. S. t. and terminal spaces white except at apex, which is slate gray with a brown tinge. The apical dark area is crossed by the thread like, white s. t. line and emphasized by an oval black spot and some blue scales. Metallic blue scales are also found in the darker part of the basal area. Some golden brown scales are at the extreme apex, extending on to the fringes at that point. A black terminal line, broken on the veins. Fringes white except at apex, opposite the cell and at anal angle, where they are slaty gray brown. Secondaries whitish at base, becoming smoky outwardly. Fringes white, with a smoky brown line at apex. Beneath, primaries smoky, with a yellowish tinge, costa whitish with the dark blotches of the upper side more faintly reproduced. Secondaries whitish with costal margin powdery, outer margin narrowly smoky, and a smoky discal lunule. Expands .80 inch = 20 mm.

Habitat.—Walters Station, California, in March (Geo. S. Hutson).

A single male, in good condition taken in the Colorado desert. These species resembles *lanceolata* and belongs with it; but it is much smaller, the head is brown, and the collar is white at the extreme base only. The maculation differs considerably in details, the new form being really in this respect somewhat intermediate between *lanceolata* and *gonella*. The front is normally convex only, vein 5 of the secondaries is practically obsolete, and veins 3 and 4 fork half way between the end of the cell and the outer margin.

Acontia semiatra, sp. nov.

Head and thorax creamy white or yellowish with a slight reddish tinge, immaculate. Abdomen a trifle smoky, the margins of the segments narrowly white-ringed. Primaries, basal space, creamy yellow with a slight reddish tinge, and this is the underlying ground color. Basal line marked by a blackish spot on costa, and sometimes by another on the median vein. Median space a slaty, somewhat glistening black; almost solid in same specimens, usually a little mottled over the cell. The t. a. line is defined by the inner boundary of the median space, very even, with a slight outcurve centrally. The t. p. line is defined in the same way as the outer boundary of the median space, very evenly outcurved over the cell and somewhat irregularly incurved below:—the edge in the submedian interspace being somewhat jagged. Beyond this line is a shading of the yellowish ground, narrow and sometimes linear from the costa to the middle of the wing, but usually filling the subterminal space below that point. Terminal space blackish-gray, s. t. line very irregular, broken, whitish, sometimes barely traceable. A series of small white venular dots at base of fringes. The ordinary spots are much obscured or barely traceable. The orbicular may be guessed at as a more intensely black spot just without the inner margin of the median space on the cell. The reniform is usually obvious, though not defined; consisting, when best marked, of a larger inferior and smaller superior black spot, vaguely outlined by a yellowish shading. Secondaries smoky, paler at base, the fringes whitish. Beneath, a pale, smoky, iridescent yellowish, without obvious maculation; but on the primaries, with a faint reflection of the upper surface. Expands .80–.85 inch = 20–21 mm.

Habitat.—Quartzsite, Yuma Co., Arizona, in March (Geo. S. Hutson).

One male and three females, all in good condition and all very much alike. The only variation is in the amount of mottling in the upper portion of median space and in the amount of yellow in the s. t. space.

The species is quite unlike any other of our described species and does not fit properly into any of the series in my Revision of this genus. It may perhaps be best associated with *arizonæ* on superficial appearance, until other allies are found.

The front is somewhat bulging and, on the hind wings, vein 5 is well removed from 4 as well as weaker than the others.

Acontia tenuescens, sp. nov.

Head and thorax white, the head with a narrow, gray, transverse band across middle of front. Abdomen wanting, but probably white, concolorous. Primaries white from base to beyond the middle. On the costa the white is broken a little beyond the middle by an ocher yellow mark, which extends toward the reniform and is not prominent or sharply defined. Beyond this it extends almost to the apex. Orbicular wanting. Reniform of good size, round, black, mottled with blue scales, narrowly white-ringed. On the internal margin just outside the middle a moderate, fairly defined, slate gray or blackish band starts, curving upward so as involve half of the reniform and continuing on to or near to, the apex. The terminal space is variably darkened by slate-gray or blackish shadings, and there is a blackish or dark gray, broken terminal line. The fringes are white. Secondaries white, the apical region shaded with blackish; fringes white. Beneath, primaries black except the margins and fringes; secondaries white. Expands .88 inch = 22 mm.

Habitat.—Lake Worth, Florida.

Two female examples from Mrs. A. T. Slosson; both of them minus the abdomen; but otherwise perfect examples. The loss of the abdomen was in transportation and was not due to any error or omission of the collector.

This species belongs with *virginialis* Grt., and *binocula* Grt., differing from both in the well-defined narrow curved band which extends from the inner margin to the apex. In one example the apex is fully attained without break other than a fine white s. t. line: in the other the band is broken just beyond the reniform, traceable by yellow scales to the apex, where the costal margin is again dark gray. It is probable that all intermediate forms occur.

In this species the front bulges moderately, vein 5 of the secondaries is from the cross-vein, well removed from 4, and it is much weaker than the others.

A NEW SPECIES OF DIRPHIA.

By WILLIAM SCHAUS.

Dirphia carminata.

Head, collar and body below light brown.. Thorax, base of abdomen and anal hairs light red; abdomen otherwise black, banded with buff. Primaries light red; the veins on outer half finely white; an inner dark spot on costa, one on median, and another on submedian, black, shaded on either side with white: an outer oblique interrupted black line broadly shaded with white above and below cell and on inner margin. Secondaries: basal half light reddish-brown; a large dark spot at end of cell; a dark outer band, outwardly shaded with whitish; the outer part of wing brownish-black; the veins finely white; fringe whitish. Expanse, 95 mm.

Habitat.—Jalapa, Mexico.

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THE LARVA OF CARAMA CRETATA.

By HARRISON G. DYAR.

The larva occurs on the red-bud (*Cercis canadensis*) in the vicinity of Washington, D. C., gregariously at first but scattering somewhat over the tree and feeding singly when half grown. They do not wander widely as with the allied *Lagoa crispata.* Structurally the larvæ are as in *Lagoa*, but in coloration differ markedly, being furnished with but thin pale hair, the skin being brightly colored in yellow, red and black. A somewhat similar modification is seen in the Porto Rican *Megalopyge krugii*, but the continental species is more strongly marked. The last five stages of *Carama cretata* came under observation, all essentially alike.

Larva. Head dark brown; width about 2 mm. Shape as in *Lagoa* with hookless feet on joints 6 and 11, besides the usual ones; long pointed everted glands behind the spiracles; impressed dots situated as in the spined Cochlidiidæ. Thick, flattened, joint 2 hood-shaped, smooth, but hairy. Four rows of warts on the thorax, three on the abdomen, normal. Pale yellow subventrally, on the hood and the warts with a circular area around each; on joints 3–5 and 12–13 deep brown-red dorsally to the lateral wart, shaded, running close to the warts; on joints 5–11 deep black cut by the round spots about the warts of subdorsal row (i + ii) and incised by semicircular areas about the lateral warts (iii), not reaching below these. Depressed spaces (1) and (4) white with clear dots, those of (1) paired; (2) represented by dots only. Hairs of two kinds, short and spiny with large basal cones, and long (12 mm.) feathery ones, white. A few hairs on foot base.

Cocoon, formed in the ground. Dorsal side arched with a low median carina; a narrow hollow margin along each side; ventral surface flattened with a squarish tubelike projection in the middle; anterior end with an imperfect flap or lid covered by the arch of the dorsal surface.

Emergence in July, mature larvæ in September; single brooded.

PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING OF DECEMBER 17, 1901.

Held at the American Museum of Natural History. Not having a quorum present an informal meeting was held.

Dr. E. C. Van Dyke made a few remarks on the *Cychrini*. He spoke of the fact that his studies had led him to the conclusion that too much stress was laid upon the male tarsal structure and that such things as color, the shape of the thorax, shape of the elytra, etc., were in many cases not even of specific value. The whole group needs revision but the time is not quite ripe for it, because we have not yet enough material. When it is revised, however, he thought that the various subgenera would have to be done away with, inasmuch as they did not represent true relationship. Bearing upon this latter point he stated that he had looked over a number of the European species of *Cychrus*, all of which were supposed to belong to the primary subgenus *Cychrus* itself, with ♂ tarsi no more dilated than were those of the ♀. He found that in a number the ♂ tarsi were very perceptibly broader than the ♀ tarsi and that one species from the Caucasus, *C. æneus* var. *starki*, had males with tarsi about twice as broad as were those of the ♀ or as broad as is the case with most of those now placed in the subgenus *Brennus*. *C. merkeli* and *C. idahoensis* two closely related species and undoubted members of the subgenus *Sphæroderus* were though, to be almost as closely related to *C. marginatus*, a member of the subgenus *Brennus* as they were to their companions *C. regularis*, *C. relictus* and *C. canadensis*. The members of the *cristatus* group of *Brennus* were thought to be more closely related to *Cychrus* through *C. angulatus*, than they were to many of those with which they were placed.

Such species as *C. mimus* and *C. punctulatus*, undoubted relatives, in spite of differences in ♂ tarsal structure, were also thought to be much more closely related to the *cristatus* group than to any other.

Speaking about gradations of tarsal and thoracic structures he mentioned the fact he had seen a complete gradation from the true *angusticollis* through *C. velutinus* and *longipes* to *opacus*, in this regard proving beyond a doubt that all three of the latter were nothing more than races or at most varieties. The same thing, he thinks, will be found to exist in the species of the *andrewsi* group. *Hemphillii* and *ricksecker*i will also probably have to be placed much closer together than they are at present.

At the conclusion of his remarks Dr. Van Dyke exhibited a few interesting species of the genus, among them the true *cristatus* with bluish margin to thorax and elytra; the opaque black species formerly called such but will have to be given the name, *C. reticulatus* Mots., and also Mr. Casey's very interesting *incipiens*.

MEETING OF JANUARY 7, 1902.

Held at the American Museum of Natural History. President Beutenmüller in the chair. Eight members and one visitor in attendance.

Mr. Kearfott, as chairman of the Field Committee, reported of the outings arranged, the attendance and work done in the field the past season and made some recommendations and suggestions for the coming year.

It was moved and seconded that the society proceed with the nomination of officers for the ensuing year.

The following officers were elected: President, Mr. C. F. Groth; Vice-president, Mr. W. D. Kearfott; Treasurer, Mr. L. H. Joutel; Recording and Corresponding Secretary, Mr. H. G. Barber. Executive Committee, Wm. Beutenmüller, C. Schaeffer, Chas. Palm, W. D. Kearfott and E. D. Love. Publication Committee, Wm. Beutenmüller, C. Schaeffer, L. H. Joutel and E. G. Love.

After the election Mr. Beutenmüller expressed his thanks to the society.

Mr. Groth, the newly elected president then took the chair.

Mr. H. C. Fall and Dr. E. C. Van Dyke were elected as corresponding members.

Mr. Frederick V. Green, of 111 Chamber St., was proposed by Dr. Lagai and Mr. Eugene A. Bremser, of 45 Riverdale Ave., Yonkers, by Mr. Schaeffer in behalf of Mr. Watson, an active member of the society.

Mr. Hug sent an invitation to the society to spend an evening at his house. The invitation was accepted with thanks and the second meeting in February was decided upon.

Mr. Schaeffer announced the death of Mr. Ottoman Dietz.

On motion Messrs. Beutenmüller and Schaeffer were appointed a committee to draw up resolutions to be printed in the JOURNAL.

MEETING OF JANUARY 21, 1902.

Held at the American Museum of Natural History. President C. F. Groth in the chair. Eleven members present.

Mr. Eugene A. Bremser and Mr. Frederick V. Green were elected active members of the society.

Mr. Watson proposed Mr. Roy S. Richardson, of 333 Halsey St., Brooklyn, as an active member of the society.

The resignation of Mrs. A. L. Lesher was read and accepted.

President Groth announced the following standing committees for the ensuing year: Auditing Committee, Messrs. Barber, Beutenmüller and Schaeffer Field Committee, Watson and Comstock. Delegate to the Scientific Alliance, Messrs. Beutenmüller and Love.

Mr. Schaeffer exhibited a specimen of *Amblychila piccolimini* in behalf of Dr. Lagai, also a specimen of *A. cylindriformis* for comparison and made a few remarks on the different opinions concerning the validity of the species.

After adjournment of the regular meeting Messrs. Beutenmüller and Kearfott conducted the sale of insects for the annual auction of the society. The amount realized from the auction was $95.55.

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PLUSIA AND ALLIED GENERA WITH DESCRIPTIONS OF NEW SPECIES.

(PLATES VI–IX.)

BY RODRIGUES OTTOLENGUI, NEW YORK.

About six years ago I announced my intention of monographing the Plusias of North America, and by this time I have no doubt that many have imagined that I had abandoned the project. The truth is, that there is already sufficient confusion in the literature of entomology to render it obligatory upon a new writer to work slowly and if possible to delay publication until such time as he may have data before him, of such character as will, or should, prevent his making new errors, while attempting a correction of the old.

I must confess that even now I do not consider that I have terminated my study of this interesting group, but the promise of a new catalogue by Dr. Dyar has made it seem advisable for me to publish a paper, in which I may record the results of my investigations so far as they have gone. Having occupied myself exclusively with the identification of the names already in our list, I have made no effort to distinguish between genera, though convinced by superficial observation that the single name *Plusia* is inadequate to cover the quite divergent forms that hitherto have been thus indicated. The time being short, therefore, and feeling entirely unwilling, indeed incapable of erecting structural characters upon which to rest generic nominations, I have referred that portion of the work to Dr. Dyar, whose paper, separating the *Plusia* group into different genera is published herewith.

After admitting my ignorance of structural differentiation it would not be right for me to alter the classification of species as placed by Dr. Dyar. I have however removed one species, and will comment upon the placing of two others. *Ornata* was described by myself from a single specimen in the National Museum collection. It had been papered and probably thereby injured and much flattened. The head parts were in fair condition; at any rate the absence of any tubercle in front, and the length of the palpi separated it from *Basilodes* which it superficially resembled because of its metallic coloration. But it did not seem justifiable to erect a new genus upon so poor a specimen, and it was tentatively placed with *Deva* when described. Dr. Dyar in his manuscript list before me places it with *venusta*, *contexta* and *putnami* under *Euchalcia*, and, replying to my protest, says he cannot separate it structurally. To my mind these three make quite a distinct group, placed with which *ornata* would be such a foreigner as to make it unbelievable. Considering the condition of the type therefore, I deem it best to await the discovery of good specimens before finally classifying. It is already placed in a genus where it does not belong, but it is better there than removed to another equally doubtful. Consequently I list it with *Panchrysia* which replaces *Deva*.

Under *Plusia* Dr. Dyar lists *metallica*, at which I am surprised. While we have but three true Plusias in this country taking *chrysitis* as the type, the fauna of the world includes many, in which the metallic discal sign is absent. It seems odd therefore that *metallica* with its very conspicuous metallic sign should fall into this companionship.

In regard to *Syngrapha*, I should have expected to find all the species having yellow hind wings under this one genus as apparently was intended by Hübner. Structurally, however, Dr. Dyar says they separate, and I list them accordingly, with considerable surprise that *parilis* should fall here. These comments are not at all meant as adverse criticism of Dr. Dyar's classification; the points mentioned simply appear to me of sufficient importance to be noted.

My first special interest in *Plusia* began from the fact that I found myself in possession of more forms than I could find in any one collection, and furthermore because, in going from one collection to another, to obtain names for my material, I discovered a sad confusion in identification. For example *pseudogamma* was nearly everywhere labeled *monodon*, which may account for the fact that Professor

Smith subsequently renamed the true *monodon*, calling it *insolita*. My own accession of material was largely due to my work in the White Mountain region, where it may be interesting to note, that in one season, I captured eighteen species around the piazza lights of the Waumbek Hotel, at Jefferson.

Since announcing my interest in *Plusia* I have received the most liberal assistance from collectors everywhere. Indeed, so many have aided me in one way or another, that I shall not attempt to mention them all by name, for fear of omissions. For the presentation of material from which I have made new types I must particularly thank all of those whose names are mentioned in connection with the descriptions. Great obligation is due to Sir Geo. Hampson, Mr. Schaus and Professor Smith for comparing material for me at different times, with the types and material in the British Museum. For comparing my insects with types I must likewise thank Professor French and Mrs. Fernald, the latter very kindly forwarding her type of *surena* to me at a time when it was presumably unique. I was able, however, to match it with a specimen in my own possession, but never really knew the species till Mr. Roland Thaxter kindly presented me with a magnificent fresh example which proved conclusively that only a poor description can be based upon a poor type. I should also specially mention Dr. Barnes, Dr. Bethune and Professor Smith, all three of whom not only presented me with specimens which proved to be new, but likewise forwarded me all of their material.

I must now indicate briefly the method which I have adopted in working out the synonomy, in order that subsequent students may fairly determine upon the value of my deductions. Having obtained, as far as possible, copies of all the descriptions of species listed as North American, I first endeavored to satisfy myself of the correctness of my labels by comparing material with descriptions. I very soon gave this over as unsatisfactory because it could not be certain beyond possibility of doubt. The earlier description may have been adequate when made, but in many instances, the subsequent discovery of other species closely allied has rendered the descriptions unsatisfactory, fitting as they do several forms almost equally well. An author, knowing but a few species, necessarily was ignorant of the very characteristics which prove most reliable as distinguishing marks, and therefore failed to record them at all. On the other hand many considered the metallic sign of great specific value and often minute description of this mark is given. A study of all the Plusias shows that it is not at all reliable. It is variable among individuals of the same species (sometimes differing even in the two wings of the same insect); and again is identical in species which are quite distinct.

In this dilemma I decided as far as possible to obtain access to the types, in order to know what had been before the authors. I have myself made comparison with the types in the Neumoegen and Edwards collections in New York, and with the types in the National Museum. Mrs. Fernald sent me the type of *surena*, and Professor French made comparisons for me with his type of *lenzii*. I sent about forty species to the British Museum where Sir Geo. Hampson made comparisons for me, naming the specimens as they agreed with types or material similarly named. I should mention that my material was sent to him without labels of any kind, being merely numbered so that the correct labels could be replaced on their return. Some of these identifications proving quite unexpected to me, I decided to verify the work, and intrusted to Mr. Schaus a similar lot of insects including some species not forwarded at first, and he very kindly went over the ground again, comparing my material with the types and material in the British Museum and labeling them according to his identifications. Even this left a few points in doubt and I took advantage of Professor Smith's kind offer to make comparisons for me, and on his last visit to Europe he looked up several species for me and wrote out his opinions.

From the comparisons which have been made for me I find that the tendency in the British Museum is to "lump" species. Several of our American species have come back to me with Old World names. It is not unnatural perhaps, for the custodians of a great world collection such as is in the British Museum to place side by side all insects which resemble one another, looking upon countries or even continents as mere localities, and the resulting aggregation as simply a "series." To make my meaning plainer, I take it that in the British Museum collection, Canada, the United States, Brazil, Chili, England, Germany, Russia, Siberia, India, New South Wales, Egypt, etc., have about the same value on labels, as Pennsylvania, Florida, Illinois, California, etc., would have in a North American collection. In a world series of this character apparently, the first name published is attached to the "series," and all others are counted as synonyms.

Whilst I shall not attempt even to contribute my views to the moot question: "What is a species," I will say most emphatically that I cannot at present follow the example of the British Museum. Even in a final universally adopted classification I doubt that names from the four quarters of the world will be, or should be, dumped into the synonymy. At best even in a species distributed all over the world we should have races and such races should have names. With such a scheme generally adopted I should not object to considering *californica* the American race of *gamma*, and *putnami* the American race of *festucæ*, but for the present I retain the American names of these and other species as distinct, or at least distinguishing; for aside from other considerations, I am able to separate all the American forms from their nearest Old World relatives by superficial examination alone. Moreover, so far as I have gone in the examination of genitalia, they are separable by that means.

There is a word to be said about the value of names. A name always stands as a record of work. It may not have been good work, and an error may have been committed; nevertheless the name and the work back of it should not be discredited without reasonable certainty that the name represents duplication, and I hold that the wider apart the localities of the types the less likelihood is there of duplication. If a name from Africa must go into the synonymy because a man in Germany thinks there is but one species flying both in Africa and Asia, it is not unlikely that some future worker with African material, finding a form without a recognized name, will rename the species, and thus the German gentleman will have caused the very duplication which he endeavored to obviate.

Adopting the generic separation proposed by Dr. Dyar, I append the following list of species belonging to the Plusia group. In doing so, I wish future students to take into consideration the fact that I have in my personal collection examples of every species listed as valid, except *pedalis*, which is known only by the type; and *ornata* and *epsilon*, both described by myself, the types being unique specimens in National Museum collection; nor have I *palligera*, nor *morigera*, but the types being in the Edwards collection have been easily accessible. In regard to *pedalis*, the description of which is meager, I have a colored drawing made for me from the type, as I have of numerous other types, by which means I have satisfied myself of the comparisons made for me by others. I have also the opinion of

Professor Smith, who personally examined the type of *pedalis* that it is distinct from anything in my collection.

Polychrysia *Hbn.*

- **trabea** *Sm.*
- **formosa** *Grt.*

Panchrysia *Hbn.*

- **purpurigera** *Walk.*
- **palligera** *Grt.*
- **morigera** *Hy. Edw.*
- **ornata** *Ottol.*

Plusia *Ochs.*

- **ærea** *Hbn.*
- **æroides** *Grt.*
- **balluca** *Geyer.*
- **metallica** *Grt.*
    - *scapularis* HY. EDW.
    - *lenzii* FRENCH.

Euchalcia *Hbn.*

- **venusta** *Walk.*
    - *striatella* GRT.
- **contexta** *Grt.*
- **putnami** *Grt.*

Eosphoropteryx *Dyar.*

- **thyatiroides** *Guen.*

Autographa *Hbn.*

- **mappa** *G. & R.*
- **bimaculata** *Steph.*
    - *u-brevis* GUEN.
- **biloba** *Steph.*
- **solida** *Ottol.*
- **californica** *Speyer.*
    - *russea* HY. EDW.
- **pseudogamma** *Grt.*
- **labrosa** *Grt.*
- **corrusca** *Strk.*
- **ou** *Gn.*
    - *fratella* GRT.
- **pedalis** *Grt.*
- **arctica** *Ottol.*
- **verruca** *Fabr.*
    - *rutila* WALK.
- **precationis** *Guen.*
- **rogationis** *Guen.*
    - *dyaus* GRT.
    - *includens* WALK.
    - *hamifera* WALK.
    - *culta* LINT.
- **brassicæ** *Riley.*
    - *echinocystis* BEHR.
- **oxygramma** *Speyer.*
    - *indigna* WALK.
- **abrota** *Druce.*
- **egena** *Gn.*
- **flagellum** *Walk.*
    - *monodon* GRT.
    - *insolita* SM.
- **rubidus** *Ottol.*
- **rectangula** *Kirby.*
    - *mortuorum* GUEN.
- **alias** *Ottol.*
- **octoscripta** *Sand.*
- **altera** *Ottol.*
- **espilon** *Ottol.*
- **zeta** *Ottol.*
- **varianna** *Ottol.*
- **vaccinii** *Hy. Edw.*
- **pallida** *Ottol.*
- **angulidens** *Sm.*
- **excelsa** *Ottol.*
- **celsa** *Hy. Edw.*
- **selecta** *Walk.*
    - *viridisignata* GRT.
- **v-alba** *Ottol.*
- **epigæa** *Grt.*
- **ampla** *Walk.*
    - *alterna* STRK.
- **surena** *Grt.*
- **speciosa** *Ottol.*
- **falcifera** *Kirby.*
    - var. **simplex** *Guen.*
- **simplicima** *Ottol.*
- **pasiphæa** *Grt.*
- **albavitta** *Ottol.*
- **basigera** *Walk.*
    - *laticlavia* MORR.
- **diasema** *Bdv.*

sackeni *Grt.*
snowi *Hy. Edw.*

Syngrapha *Hbn.*

devergens *Hbn.*
(?) *alticola* WALK.
hochenwarthi *Hoch.*
ignea *Grt.*
parilis *Hbn.*
quadriplaga WALK.

Polychrysia trabea *Sm.*

This is very close to *moneta* of Europe. My European specimens are from Germany and are somewhat darker, more orange colored. My specimens of *trabea* agree with the type and are from the same locality, but I have been unable to obtain male specimens, and thus have not examined the genitalia.

Panchrysia *Hub.*

The type of *purpurigera* is in the British Museum. The species is well known and widely distributed. (Pl. VII, Fig. 1.) The types of *morigera* and *palligera* are both in the American Museum of Natural History, Edwards Collection. I have seen no others. The type of *ornata* is in the National Museum.

Plusia æreoides *Grt.* (Pl. VII, Fig. 3.)

My material compared with type in British Museum.

Plusia balluca *Geyer.* (Pl. VII, Fig. 9.)

My material compared with type in British Museum.

Plusia metallica *Grt.* (Pl. VII, Fig. 7.)

The type of *metallica* is in the British Museum; a specimen of mine identified by comparison with the British Museum type of *metallica* also agrees with the type of *scapularis* in Neumoegen Collection; it was then forwarded to Professor French who returned it to me labeled *lenzii*, at the same time writing to me "this is straight enough *lenzii*."

Euchalcia venusta *Walk.* (Pl. VII, Fig. 11.)

My material identified by type in British Museum; *striatella* Grote is the same species.

Euchalcia contexta *Grt.* (Pl. VII, Fig. 12.)

My material identified by type in British Museum where the species is queried, however, as a variety of *festucæ*, an evidence of the tendency towards lumping.

Euchalcia putnami *Grt.* (Pl. VII, Fig. 13.)

Professor Smith in his Catalogue of Noctuidæ records the type as being in the British Museum. It is not there at present. The species is lumped with *festucæ*, despite the fact that Mr. Grote published valid reasons for separating them. The genitalia are similar but not identical. Moreover there are possibly two or even three similar forms on this continent, which may be separable later by the genitalia and other characteristics. More material and further study is required to determine this.

Eosphoropterxy thyatiroides *Guen.* (Pl. IX, Fig. 12.)

My material identified by comparison with type in British Museum.

Autographa bimaculata *Steph.* (Pl. VII, Fig. 5.)

The type of *u-brevis*, said to be synonymous, is credited by Professor Smith, in his Catalogue of Noctuidæ, to the British Museum. My material sent there for identification is labeled as agreeing with their specimens of *bimaculata*, but no reference is made to *u-brevis*. Either the type is absent, or else is perhaps mixed with the *bimaculata* specimens. There seems no reason however to doubt the synonymy. I may record here my belief in a distinct form in the Northwest, which on further study may merit a name, either as a geographical race, or else as a new species.

Autographa solida, sp. nov. (Pl. VI, Fig. 5.)

Coloration exactly as in *metallica*—ground color creamy fulvous, shadows, especially apical and median spaces, darker with metallic golden scales interspersed, secondaries and fringes concolorous T. a. line faint or absent above the median vein, below the vein incurved from the sign to the lower border of the wing, sharply defined, metallic. T. p. line thread-like, neat, two outward curves, one towards apex, one opposite the large silver sign; one inward curve between the two signs. The sign is metallic silvery, bilobed, the space between the lobes somewhat less proportionately than in *biloba*. The inner half of the sign lies with a flat border against the median vein, the outer half being entirely below the vein. Above the vein, just where it branches is a second silver spot, much smaller, ovate, lying horizontally (the wings spread) practically solid, though a minute speck made up of the golden brown scales cuts the spot upwardly. At the apex there is an ovate upright spot of golden brown, with a prolongation pointing down and reaching the t. a. line opposite the smaller silver sign. Along the costa near the thorax is a well-defined silver spot, pyramidal with its apex dull, its base on the vein. Secondaries slightly darker towards the base. Expanse, 30 mm.

Habitat: Texas; Mexico and south.

Type: With the author.

This specimen, from Texas, was a unique in the collection of Mr. Herman Strecker from whom it was obtained, by the author (*mirabile dictu*). A second specimen, from Mexico, was presented by Mr. Wm.

Schaus who says that the species is not uncommon in Mexico where it is confounded with *biloba*. The Mexican specimen is darker than the type. *Solida* differs from *biloba*, in its smaller size, very different, lighter color; and the solid upper silver spot, which in *biloba* is simply an ovate line open below. There is also a very distinct dash extending from the t. p. line outwardly to the fringes, about the center of the wing in *biloba*, which is entirely absent in *solida*.

Autographa californica *Speyer*. (Pl. VIII, Fig. 11.)

This name brings us to one of the most argued questions. My material sent to the British Museum for identification is returned with the statement that *pseudogamma* (Pl. IX, Fig. 8), of which they have the type, is placed with *californica*. Professor Smith in his Catalogue of Noctuidæ lists *gamma*, with the expressed opinion that *californica* is the western and *pseudogamma* the northern form of *gamma*. Later he lists *ou*, with *californica* and *russea* as varieties.

The genitalia of *californica* and *pseudogamma* are distinct, which will satisfy Professor Smith as to the separableness of the species. The same, in a somewhat lesser degree, is true of *californica* and European specimens of *gamma*. In regard to locality I have *californica* as far north as Calgary and as far east as Syracuse, N. Y. I have *pseudogamma* from Calgary and from the White Mts. In short it flies in the same regions with *californica*. Professor Smith's reference of *californica* to *ou* is interesting. It is quite distinct from *ou* but in *pattern* it does resemble *gamma*, while in coloration, *gamma* in turn might be mistaken for *ou*. *Californica* is subject to much variation, but as distinguished from *gamma* it is a contrasty species, while *gamma* is suffused in color. Twenty-four specimens of *californica* are before me, and twelve of European *gamma*, and viewed as a group the two forms are readily distinguishable. The most contrasty specimen of *gamma* perhaps might be confused with the most suffused of *californica*. The twelve of *gamma*, compared with a like number of *ou* (the latter including Mexican examples), require a study of the pattern for differentiation, the color scheme being the same. *Russea* is only a rather reddish form of *californica*, aberrational rather than varietal. *Fratella* is a starved *ou*. I have a specimen agreeing exactly with the type in size as well as pattern. Coming from a torrid locality we may well imagine a scarcity of food, and it is interesting to note that I have an equally small *californica* from an ice-clad region.

Autographa labrosa *Grt.* (Pl. VII, Fig. 14.)

My material compared with type in British Museum.

Autographa corrusca *Strecker.* (Pl. VII, Fig. 15.)

One of my specimens was obtained from Mr. Strecker and is labeled by him as agreeing with the type.

Autographa arctica, sp. nov. (Pl. VI, Fig. 11.)

Dull brown, the only gray shades being along the costal end of t. p. line, and at inner angle. The terminal line is also gray. T. a. line, three short outward curves, below the median vein. T. a. line begins with a hook at costa, descending fairly straight, inwardly bent, trembled. It is fairly distinct. The s. t. line black, apical outcurve rounding. Orbicular distinct, outlined in black, lies immediately in the course of the t. a. line. Reniform, outlined in black. Sign, golden, shaped as in *gamma*. Secondaries brownish, lighter at the base, crossed by yellowish band. Fringes cut. Expands, 32 mm.

Habitat: Alaska.

Type: 6258 in National Museum.

Described from eight specimens found in the collection of National Museum, Washington, D. C. Taken by L. M. Turner, September 5, 1880, at Alter Islands, Alaska. Co-type with the author, and Professor Smith also has specimens. The species is allied to *interrogationis*, from which however it is abundantly distinct, a good series of *interrogationis* with its variations having been examined. The genitalia also differ.

Autographa verruca *Fabr.* (Pl. VIII, Fig. 2.)

Rutila Walk., is a synonym. The type of Walker's species is in the British Museum.

Autographa precationis *Guen.* (Pl. IX, Fig. 6.)

My material agrees with type in British Museum.

Autographa rogationis *Guen.* (Pl. IX, Fig. 1.)

Dyaus Grt., *includens* Walk., and *hamifera* Walk., I accept as synonyms. The British Museum adds the following also to the synonymy; *eriosima* Doubl., from New Zealand; *chrysosema* Zell.; *acuta* Walk., from Congo, South Africa; *adjuncta* Walk., from Moreton Bay, Australia. All of Walker's types are in the British Museum, but considering the localities I am not willing to assume any responsibility of connecting so many names, especially so many from a single author. I add *culta* to the synonymy on the following evidence. I examined the type of *culta* in the presence of Professor Lintner, and he gave me one of two accompanying specimens which he declared were from the original lot. I make this statement as authenticating my specimen, because since Dr. Lintner's death I have been unable to find the type in the Albany collection. My *culta* is merely a small example of *rogationis*. Fortunately it was a male, and I succeeded in obtaining the genitalia. It is absolutely identical with that of *rogationis*, and is so remarkably distinct from all other of the Plusias in its extremely long slender clasper that the worst skeptic in regard to the value of genitalia, would I think accept the evidence.

Autographa brassicæ *Riley*. (Pl. IX, Fig. 11.)

My specimens agree with Riley's type in National Museum. I have a specimen sent to me by Professor Behr labelled by him *echinocystis* which authorizes my placing Behr's name in the synonymy.

Autographa oxygramma *Speyer*. (Pl. IX, Fig. 10.)

Indigna Walker is a synonym. The type of *indigna* is in the British Museum, my material agreeing with it.

Autographa abrota *Druce*. (Pl. IX, Fig. 4.)

This is a new name in our list. It was communicated to me by Dr. Barnes, he having received it from Florida. Its general appearance is somewhat like *oxygramma* in coloration and wing shape; though the apices of *abrota* are more rounded. There is an extraordinary development of hairs along the abdomen and the genitalia are so totally different from other *Plusia* forms that it may be removed from the present genus in the future. I supposed it to be a new species when received, but sent it to England with the material intrusted to Mr. Schaus, and he found that it agrees with the type of *abrota* in Mr. Druce's collection. It was described from Mexico.

Autographa flagellum *Walk*. (Pl. IX, Fig. 9.)

My material agrees with the types of *flagellum* Walk., and *monodon* Grt., both of which are in the British Museum. Also with the type of *insolita* Smith in the National Museum.

Autographa rubidus, sp. nov. (Pl. VI, Fig. 4.)

Color golden brown overcast with lighter shades of purplish pink. T. a. line curved outwardly, faint above the median vein, below the vein distinct, metallic, connected with the sign. T. p. line very faint, a succession of slight outward curves between the veins, very oblique from costa to the sign, and then descending more directly. S. t. line faint, curved outwardly near apex, and two similar smaller curves opposite the sign. Terminal line of the lighter shade, thread-like, distinct in contrast to the fringes; the latter cut.

The sign is metallic, made up of two lines curving downward and outward from median vein, meeting in a sharp point. Described more generally, conspicuous features of the pattern are a bright oblique patch of the lighter color near the apex, showing conspicuously against the darkest part of the s. t. line, at the large curve thereof. Just below the sign is a long narrow patch of golden scales.

Secondaries yellowish at the base, with wide border of dark brown. Expands 35 mm.

Habitat: Manitoba; New Brunswick.

Type: Female in collection of the author.

Described from three specimens. The first was sent to me by Mr. A. W. Hanham, of Winnipeg, but had been taken by Mr. E. Fernstone Heath at Cartwright, Manitoba, in September. A second specimen was received from Mr. Heath direct, and a third from Mr. W. McIntosh, of St. John, New Brunswick.

Autographa rectangula *Kirby.* (Pl. VIII, Fig. 12.)

Here we lose one of our best known names, *mortuorum* Gn. The description of *mortuorum* seemed to apply to our species so poorly that I was much in doubt. The species, as all American collectors know it, is prominently silvered. In the description there is slight reference to this characteristic. However, Professor Smith personally examined Guenee's type in the British Museum for me, and states that, though showing less silver than usual, "it is undoubtedly our species." This relegates the name to the synonymy. Kirby's postscript to his description of *rectangula* is more helpful than his description; he says: "The silvery rectangular spot in the primary wings of this insect, when they are brought near to each other, forms a quadrangular area very much resembling a picture in a silver frame." This identifies the *mortuorum* of American collections at once.

Autographa u-aureum *Guen.*

Probably all American collectors imagine that they have this species. It is an instance of a false identification which has become perpetuated. The description does not fit the American species which has been carrying the name, at all. A specimen of the American *u-aureum* comes back to me from the British Museum labeled "*u-aureum* Gn., var. of *mortuorum*?" Another evidence of the desire to lump. A specimen of our *vaccinii* also is returned labeled "*u-aureum*." A specimen of *angulidens* was labeled "*angulidens* var. *u-aureum*?" These labels, however, led to a comparison of the description with *vaccinii* with which it agrees better than with any other American species. But *vaccinii* is almost the most localized of all of our species so far as now known, being absolutely confined to the summit of Mount Washington and neighboring peaks, and has never been authentically reported below the tree line. *U-aureum* having been described from a Swedish locality, and the description associating it with *interrogationis*, we may safely drop it from our list.

This renders it needful to name the species which has so long passed as *u-aureum*, for which reason I have nominated it *Autographa alias*.

Autographa alias, sp. nov. (Pl. VIII, Figs. 7 and 13.)

This is a species best described by a figure; even accurate word description of the usual lines, signs and spaces would be almost as applicable to several other closely allied but positively distinct species, the nearest being *rectangula* (*mortuorum*). *Alias* is the species which has so long borne the name *u-aureum* in American collections, the latter however being quite distinct and nearer to our *vaccinii*. The pattern is practically the same as in *rectangula*. The sign is identical in shape and color, silvery. In a long series before me (twenty-four specimens) there are all gradations of coloration from a suffused form with indistinct lines, and no silvering, except the sign, to a form with sufficient contrast to render the lines, especially the s. t. line quite distinct, a great deal of silvering being present, especially at base of primaries. As *rectangula* also varies in the degree of silvering, from a form almost all silver to one having very little, it is needful to say that there is never so much silver in *alias* as in *rectangula*, and that the space between the t. p. line and the s. t. line is always dark and free from silvering, while in *rectangula* the same is always silvery in proportion to the rest of the wing. The genitalia are distinct. Expands, 32 to 34 mm.

Habitat: Common throughout the Northern States and Canada.

Type: Male in collection of the author.

Autographa altera, sp. nov. (Pl. VIII, Fig. 9.)

Allied to *octoscripta*, which it very closely resembles. It becomes essential, therefore, to indicate the differences. The color of *octoscripta* is blackish in the darker shadows, grayish in the lighter parts. Usually the darker shades greatly predominate. In *altera* the darker shades are brown, and the lighter a sort of gray overcast with purplish. The dark and light shades are about evenly distributed. The t. p. line in *octoscripta* is waved, fairly straight, conspicuous, and whitish. In *altera* it is in longer curves, more bent, very faint and indistinct. The s. t. line in *octoscripta* is black, square at the bend near the apex. In *altera* the same part of the s. t. line is only slightly extended outwardly and is dentate. The outer border of *octoscripta* is only slightly paler than the rest of the wing, while the terminal line and fringes are conspicuous. In *altera* the terminal line and fringes are concolorous with the space without the s. t. line, which thus appears as an outer band, much paler than rest of the wing. The orbicular and reniform are easily seen in *octoscripta*, very inconspicuous in *altera*. The sign in the type is metallic, a silver V with a dot outwardly, disconnected. In a second specimen, however, the sign is as in typical *octoscripta*. The secondaries in *octoscripta* are yellowish at the base, and show a wide blackish border. In *altera* they are brownish, slightly darker outwardly, crossed by a yellowish band. Expands, 29 mm.

Habitat: Adirondacks and Canada.

Type: Female, with the author.

Described from a specimen taken at Lake Nepigon, Aug. 22, 1888, by Dr. Bethune, a second specimen taken by Dr. Chas. McKnight in the Adirondacks also in August. *Altera* is smaller than *octoscripta* with wings proportionately wider. Measured along the costa from the thorax to the apex, the primary of *altera* is 15 mm., and from apex to hind angle, 10 mm. *Octoscripta* measured similarly gives a wing 20 mm. by 10 mm. Fine specimens of both are before me.

Autographa epsilon *Ottol.* (Pl. VI, Fig. 8.)

This species, which is figured herewith, was described in the Proceedings of the Washington Academy of Sciences, Vol. II, pp. 494-495.

Autographa zeta, sp. nov. (Pl. VI, Fig. 1.)

Chocolate brown, the base, outer border and a small area near the costa between the t. p. and s. t. lines of a purplish gray, affording a sufficient contrast to render the lines distinct. T. a. line three short outcurves below the vein, seemingly yellowish or purplish metallic. T. p. line, geminate, waved, with one inward dentation opposite the sign. The s. t. line as usual, the apical outcurve dentate, rather than squared. The line is blackish, heavy near the apical outcurve, distinct throughout. Orbicular, large, outlined with gray. Reniform small, black, seemingly horizontal, else there is an extra black spot outwardly. The sign is white, satiny, somewhat like the Greek letter zeta, lying horizontally. Immediately under and beyond the sign, the brown color is deepest, fading away in all directions. Secondaries brown, with inconspicuous lighter bar crossing centrally. Fringes cut. Expands, 35 mm.

Habitat: Northwest Territory.

Type: Female, with the author.

Described from one female presented by Mr. Jacob Doll, having long been in his collection. It is noteworthy that the wings are unusually wide, measuring 17 mm. along the costa, and 13 mm. from apex to hind angle.

Autographa variana, sp. nov. (Pl. VI, Fig. 10.)

Again we have a species where description needs the assistance of the figure, which fortunately is quite good. In pattern it follows the *rectangula*, *alias* group.

Its great contrast of dark brown and pearl gray renders it at once recognizable. The sign is similar in shape, but golden rather than silver. The t. p. line is a succession of short waves; the same line in *alias* being three long, gentle curves. The s. t. line at its first outward curve, is dentate and nearly or quite touches the terminal line; in *alias* this part of the line forms three sides of a square, the two angles being slightly obtuse. Opposite the sign, the first dentation in the s. t. line is prolonged to the terminal line. This is not true in *alias*. Secondaries yellowish with broad dark brown border. Fringes cut. Head and thorax pearl gray. Collar and patagiæ outlined in blackish. Expands, 33 mm.

Habitat: New Brunswick.

Type: Female, with the author.

Described from a single perfect specimen, captured by Mr. W. McIntosh, at St. John, N. B.

Autographa vaccinii *Hy. Edw.* (Pl. VIII, Fig. 3.)

A good series taken by myself on Mt. Washington agree with the type in the Edwards Collection, American Museum of Natural History.

Autographa pallida, sp. nov. (Pl. VI, Fig. 7.)

Another of the *rectangula*, *alias* group. Exceedingly pale brown with lighter shading. Immediately recognizable by the sign, which is similar to that of its congeners only reversed, the outer and inner parts of the sign being connected below instead of towards the median vein as in *rectangula*, *alias* and *variana*. The sign seems to be white, though in a truly fresh specimen it may prove to be silver. The t. p. line is waved as in *variana*. The s. t. line is more or less dentate throughout. Secondaries pale brown, darker towards the outer border, crossed by a band of much lighter (whitish) color. Fringes white, cut. Expands, 33 mm.

Habitat: Newfoundland.

Type: Female, with the author.

Described from two females, taken in Newfoundland, by Mr. Roland Thaxter.

Autographa angulidens *Sm.* (Pl. VIII, Fig. 5.)

My material identified by comparison with type in National Museum. I have never seen typical specimens of this, from any locality except Colorado, and all that I have seen from Colorado—and I have seen a great number—appear typical and constant in size and in pattern. *Angulidens* (?) from other localities, so far as I have seen, have all been my new species *excelsa*.

Autographa excelsa, sp. nov. (Pl. VI, Fig. 3.)

Closely allied to *angulidens*. Indeed, absolutely fresh specimens are needed in order to identify one from another, unless locality be considered. I have seen very numerous examples of *angulidens*, but never from any locality except Colorado, in which respect it is like *vaccinii*, which is found nowhere except above the tree line in the White Mountains. On the contrary, I have *excelsa* from the White Mountains and from Laggan, British Columbia. In *angulidens* there are strong contrasts of coloration, the lines showing distinctly against the lighter grayish shadows. In *excelsa* the color scheme is a suffusion of two shades of brown. In regard to color, the two species separate just as *californica* differs from the European *gamma*. Perhaps the surest superficial guide by which to separate *excelsa* from *angulidens* will be by the sign. In both it may be either white or golden. In *angulidens* the inner sign is like the letter U, lying slightly obliquely, the open ends curving inwardly. In *excelsa* this part of the sign is rather V-shaped, a slight inward crook however occurring on the end of the outer branch of V. The outer dot may be large, small or absent from either species. *Excelsa* is smaller than *angulidens*, the latter expanding 36 mm., the Laggan examples of *excelsa* reaching only 30 mm. A New Hampshire specimen (female), however, reaches 34 mm. in size.

Habitat: Northern United States and Canada.

Type: Female, with the author.

The type was taken by the author in Jefferson, N. H., with others like it, which have gone to other collectors as *angulidens*. One is with Mr. Thaxter. Three others before me are from Laggan, and I have seen a great many more from that locality, all very much smaller than *angulidens* which seems quite uniformly large. I should mention that the genitalia of the two species differ.

Autographa celsa *Hy. Edw.* (Pl. VIII, Fig. 4.)

My material identified by comparison with type in Neumoegen Collection, Brooklyn Institute, and with type in Edwards Collection American Museum of Natural History.

Autographa selecta *Walk.* (Pl. IX, Fig. 7.)

Selecta Walk., and *viridisignata* Grt., are both represented by type in the British Museum and material sent there for comparison is returned bearing the two names, Grote's name, the better of the two, unfortunately passing into the synonymy. I feel obliged to call attention to a fact in relation to the sign, in spite of what I have said of its slight value. Grote describes the sign as "a peculiar greenish-golden hue—verdigris-like." I have one specimen to which the words "peculiar-greenish-golden," seem most applicable. Four others are green. I once had a wreck of this species sent to me in an envelope. The two primaries however were in sufficiently good condition for identification (for which purpose the specimen had been forwarded) and the sign was quite golden. The variation then would seem to be from green to gold through the various intermediate stages. It is a little odd therefore to read in Walker's description "discal mark silvery." This is the sort of thing that makes identification from written descriptions so easy (sic?).

Autographa v-alba, sp. nov. (Pl. VI, Fig. 2.)

Color with grayish shades delineating the pattern. T. a. line, outcurved, grayish against an outer shading of dark brown. A break occurs above the median vein, the line at the costa showing as a light and a dark spot adjacent. T. p. line similarly geminate, the darker lining now occurring inwardly of the lighter line; gently curving outwardly from the costa and inwardly near the median space, dentate opposite the sign. S. t. line distinct, occurring as the sharp outline of the brownish band, against the lighter, grayish outer border, one outcurve from the costa to the median vein; two teeth opposite the sign. Orbicular small, dark, lying in a gray field between the costal terminations of the t. a. line, and the sign. Reniform faint, lined with thread of white, against broad blackish. A blotch of dark brown connects it with the costa. The sign is a V, the open ends touching the median vein, approximately white, not metallic. Fringes cut. Secondaries fuscous, darker towards the border. Expands, 40 mm.

Habitat: Wyoming.

Type: Female, in the collection of the author.

Described from a single specimen taken in Yellowstone Park, Wyoming, by Dr. William Barnes.

Examination of the figure shows one wing apparently darker than the other. This is accounted for probably by staining. The description, therefore, is made from the lighter wing, and a fresh specimen should show strong contrasts in the shading. Its large size and thin vestiture would place this with *celsa*, *ampla* and *epigæa*, but in color scheme and pattern it is very close to *surena* and *speciosa*. It would not be strange, when other specimens are taken, to find the V sign accompanied by a dot, either separated or connected.

Autographa epigæa *Grt.* (Pl. VII, Fig. 16.)

My material agrees with the type in British Museum.

Autographa ampla *Walk.* (Pl. VII, Fig. 6.)

My material agrees with type in British Museum. A specimen obtained from Mr. Strecker and labeled by himself as agreeing with his *alterna*, authenticates my statement as to synonymy.

Autographa surena *Grt.* (Pl. VIII, Fig. 10.)

My examples identified by the type kindly loaned by Mrs. Fernald.

Autographa speciosa, sp. nov. (Pl. VI, Fig. 9.)

Color chocolate brown, lines and shadows pearly gray. Coloration same as in *surena*; fresh specimens of both required for comparison, as in old or flown specimens the gray shades are lost. T. a. line a strong outcurve from costa to median vein, gray against a strong brown blotch at costa. Below the vein distinct, slightly oblique, outwardly bent, gray, apparently crossing the solid chocolate brown of the median space, the brown appearing inwardly of the line as a second line paralleling it. The t. p. line faint from the costa to median vein, distinct, geminate below, grayish; it is fairly straight, inwardly bent. The space between the t p. line and the s. t. line wider than usual, unicolorous, brown. Outwardly of the s. t. line the border is lighter, a mixture of the brown and gray shading. The s. t. line distinct as a demarcation between these two areas, as usual, outcurved near costa, with two dentations opposite the sign. Orbicular indistinct, grayish. Reniform more easily seen, blackish with gray outlines, a yellowish splotch between it and the costa. The sign is white and shaped as in the *gamma* group. Secondaries pale yellowish-brown, lighter at the base. Fringes cut. Expands, 34 mm.

Habitat: Corfield, Vancouver.

Type: Female, with the author.

Described from a single specimen taken by Mr. Clermont Livingston at Corfield, Vancouver. This is one of the most beautiful of our species, and for a new form, very satisfactorily distinct.

Autographa falcifera *Kirby*. (Pl. IX, Fig. 2.)

Kirby's description undoubtedly applies to our common insect known as *simplex*. Fortunately he described the gray form; thus *simplex* is properly retained for the brown form as a varietal name. *Falcifera* was named from Nova Scotia, and it is noteworthy that in the north the brown form is rare. *Simplex* was described from New York where the brown form is common. This seems to be the only species thus far known to me, having an authentic varietal form, the genitalia of both gray and brown specimens being identical.

Autographa simplicima, sp. nov. (Pl. VI, Fig. 6.)

Color dull brown, slightly darker in median space. T. a. line absent above the median vein; below the vein oblique, neat, metallic, inconspicuous. T. p. line, oblique, slightly waved, very faint. S. t. line starting absolutely at apex, oblique, faint, gently curving. The sign as in *falcifera*, only very small, and terminating in an acute angle. Secondaries concolorous, crossed centrally by lighter band. Expands, 28 mm.

Habitat: Washington.

Type: Female, with the author.

Described from a single female presented by Professor John B. Smith. This closely resembles the *simplex* form of *falcifera*, but is much smaller, suffused in color, and easily identified by the acute termination of the sign, which is always knobbed in *falcifera* and *simplex*. I had intended to write the name *simplicissima*—simplest—

but by an error of transcription it was sent to Dr. Dyar as *simplicima*, which being shorter may stand with this explanation of my meaning.

Autographa pasiphæa *Grt.* (Pl. IX, Fig. 14.)

My material agrees with type in British Museum.

Autographa albavitta, sp. nov. (Pl. VIII, Fig. 8.)

Pale brownish cream with base and terminal border of primaries, lines and fringes whitish. T. a. line inwardly oblique from costa to median vein, outwardly curved below the vein. T. p. line wide, prominently outcurved near apex, continuing downward as one gentle incurve. Between the t. p. and s. t. lines the darker color appears as a wide band crossing the wing. At the central part of the terminal space there is a prominent rectangular blotch, the darkest color in the pattern. This is crossed by the vein, which divides it almost equally. There is a pale blotch at the apex. The reniform, orbicular and sign are clearly outlined each by a fine yellowish line inclosing the ground color. Secondaries concolorous, crossed centrally by a faint band of lighter color. Collar, patagiæ, thorax the same, shaded with the lighter color. Fringes of all four wings, whitish, cut with darker shade. Expands, 30 mm.

Habitat: Middle California.

Described from a female, in the collection of Dr. Barnes, with whom the type remains.

This is placed among the *Plusia* group only tentatively. The discovery of a male may render it possible to more correctly classify it.

Autographa basigera *Walk.* (Pl. IX, Fig. 5.)

This is the *laticlavia* of Morr. The type of *laticlavia* is reported to be in the Tepper collection to which I have not had access. My material agrees with the type of *basigera* in British Museum, where the synonymy is made to include *adinomens* Walk., and *intracta* Walk., but not knowing the localities from which these latter were described I prefer not to intrude the names in the American list.

Autographa sackeni *Grt.* (Pl. VIII, Fig. 17.)

My material agrees with type in British Museum.

Autographa snowii *Hy. Edw.* (Pl. VIII, Fig. 16.)

In nearly all collections, and in the British Museum collection, this specimen is considered synonymous with *sackeni*, but it is very questionable whether authentic *snowi* is well known. I imagine that *sackeni* has been sometimes labeled *sackeni*, and sometimes *snowi*, so that when one collector has found himself possessed of both names he has judged the species to be identical. I have seen a plentiful number of *sackeni*, and they all meet the description accurately, except as to the metallic sign, which is variable and varies towards the described sign of *snowi*. This may have aided in the confusion. I have not been able to obtain an identification from type, but I have a specimen from Mr. Doll, by him received from Professor Snow himself, the specimen still carrying a printed label reading: "Near Hot Springs, Las Vegas, N. M., 7,000 feet, Aug., '82. F. H. Snow." Thus I feel that I have a genuine *snowi*, especially as the description fits it absolutely. It is easily separable from any *sackeni* that I have seen. It is smaller, the apex of the wing is much less produced than in *sackeni* and the color is different. As words do not adequately describe color let me resort to comparisons: The color scheme of *snowi* is the same as in *simplex*, the browns and reds being identical in shade. The coloration of *sackeni* is nearer to but not exactly the same as *ampla*. Fresh specimens of *ampla* are needed to get the reddish hues. A spot at the base of the costa is orange in *snowi*; it is more sagittate in shape and very pale yellowish in *sackeni*. In brief, the two are distinct, and the descriptions of both should be sufficient for identification, being unusually accurate.

Sygnrapha devergens *Hbn.*

Professor Smith in his catalogue lists *alticola* as distinct, and places *ignea* Grt. as a synonym thereof. The type of *alticola* is in the British Museum where it is counted synonymous with *devergens*. I place the name therefore as a synonym, but with a query, as I doubt it. Later I think I shall be able to establish that *alticola* from Northwest Territory, is distinct from *devergens* of Labrador.

Syngrapha ignea *Grt.*

This type should be in the Philadelphia collection but I could not find it. It cannot be a synonym of *alticola* however as placed in Professor Smith's catalogue, its size alone separating it. My material agrees with specimens in British Museum labeled *ignea*, presumably obtained with the Grote collection. My material, including twelve specimens, some from Colorado, and others from Calgary, N. W. T., are uniformly an inch and a quarter in expanse (one or two females a trifle larger) which is exactly the measurement recorded in the description. For these reasons I restore the name, admitting however that my studies of the yellow-winged species are quite incomplete, owing to lack of male specimens. So far as I have found, the genitalia are a very distinguishing feature from other *Plusia* forms.

Syngrapha parilis *Hbn.* (Pl. VIII, Fig. 15.)

My specimens identified at British Museum. I am not sure whether the type of *parilis* is there or not, though from their labeling of my material I should think it is. The type of *quadriplaga* Walker, is there, however, and is identical.

In closing this paper I would add but a few words in regard to separation of species. A great many are very closely allied, and single specimens of two species might be supposed to be identical, the differences being so slight. A study of good series, however, shows that the differences, though slight, are constant, and therefore reliable. The same is true of the genitalia, which must be noted very closely, and I am told that this is also true of larvæ, species feeding together, and looking alike, yet emerging as distinct forms.

One of the seemingly slight divergences which is absolutely reliable in separating species I will mention. Especially in the *rectangula* group, species may often be known by their secondaries, even when the primaries are so worn as to make identification doubtful. Broadly speaking there are two patterns: in one the base of the wing is a dirty yellowish, the border being blackish. These we may call "bordered." In the other, the base of the wing is tinged with a lighter shade of the border color, thus producing an oblique band or bar of the yellowish shade, crossing the wing centrally. These are the "banded." Of the "bordered" forms *rectangula* is a good example, while *vaccinii* is a conspicuous example of the "banded."

NOTES ON CALOCAMPA WITH DESCRIPTION OF A NEW SPECIES.

BY RODRIGUES OTTOLENGUI.

(PLATE X.)

Under this genus, Grote in his check list, 1882, listed three species, *nupera*, *cineritia*, and *curvimacula*. In Smith's list, 1891, only two names are added to the above, *brucei* and *thoracica*, the latter having been described by Putman-Cramer as a variety of *cineritia*. I undertook a closer scrutiny of the genus because of the fact that I apparently had in my collection more forms than there were names in the latest list, excepting *brucei*, of which however I had access to the type. I believed that two distinct forms were mixed under *cineritia*, as now appears to be true, though not quite as I at first supposed. I had two specimens, one exceedingly light and one so dark as to appear specifically distinct. These extremes are both figured. I began acquiring material and soon had a long series, twelve fine specimens being now before me. These show a gradation from the lighter to the darkest form, though the darkest is still considerably distinct from the next in the series. Examination of the genitalia showed however that throughout the series there is absolutely no variation, an interesting corroboration of Professor Smith's contention that variations in the genitalia will separate species, but not varieties of the same species, however dissimilar the variety may be from the type.

This study of the genitalia however disclosed the fact that *thoracica* is not a variety of *cineritia*, as it has been described and listed, but is a distinct species. This I am told has been corroborated by breeding, the larval stages of the two being also distinct.

The figures on the plate are from a woodcut, the insects having first been photographed on the wood block. They may be considered authentic. *Nupera* is from a specimen carefully compared with the type. *Brucei* is from the type itself. *Thoracica* is from a specimen in Mr. Doll's collection found with the type, labeled by Mr. Cramer and agreeing absolutely with the type. *Brillians*, the new species herewith described, is from the type.

Calocampa brillians, sp. nov. (Pl. X, Fig. 3.)

Resembling *cineritia* and *thoracica*, but overcast with purplish and mahogany shadows. Head and collar mahogany color. Thorax dark brown. Patagiæ, pearl gray towards the base of primaries. Orbicular and reniform adjacent. The former ringed with a geminate line, the outermost heavy, black. The reniform outlined heavily in black at the lower inner curve, next to the orbicular. Centrally a pale crescent, at the inner curve of which is a bright mahogany splotch, which is the beginning of an orange-colored dash extending outwardly to a wave of the s. t. line when it is sharply outlined by a black line outwardly and towards the lower margin of the dash. The t. a. line is waved or dentate with second or geminate line carrying one long outcurve towards the orbicular. T. p. line oblique, waved, inconspicuous. S. t. line with a sharp notch near apex, then slightly waved, oblique, conspicuous against the outer border of pearly gray. The s. t. line carries the black dash already mentioned. The costa is black with three white dots between the reniform region and the junction of the s. t. line. Above the orbicular and reniform and as far outward as the s. t. line the area is mahogany brown. The base is pearly gray and the median space the same, overcast with smoke. Secondaries, concolorous, mahogany brown, with fringes lighter. Expands, 45 mm.

Habitat: Maine, New Hampshire.

Type: Male in the collection of the author.

Described from three specimens. The type is absolutely perfect, taken in Maine. A co-type, labeled Webster, N. H., is a female in Professor Smith's collection. There is more suffusion, and less of the mahogany tinge, either sexual or because the specimen is older. A second co-type is in the Brooklyn Institute, found in Dr. McKnight's collection, labelled New Hampshire; a male, and though probably an old specimen, is only a little less brilliant than the type, with which, however, it agrees in all essential features.

EXPLANATION OF PLATE X.

Fig. 1.	*Calocampa nupera.*	Fig. 5.	*Calocampa brucei.*	
Fig. 2.	" *curvimacula.*	Fig. 6.	" *cinerita.*	Light.
Fig. 3.	" *brillians*, sp. nov.	Fig. 7.	" "	Dark.
Fig. 4.	" *thoracica.*			

◆

A GENERIC SUBDIVISION OF THE GENUS PLUSIA.

BY HARRISON G. DYAR.

Dr. Ottolengui has asked me to review the species of *Plusia* and refer them to generic groups. I have done so with the following result. The generic term *Phytometra* is credited to Haworth by Guenée, but I have been unable to consult a copy of the Lepidoptera Brittanica, as there is none to be found in Washington, Philadelphia or Boston. Agassiz's Nomenclator credits this genus to Stephens, and if this is correct, the term will cause no trouble, falling as a synonym.

Plusia accurata Hy. Edw., must be entirely excluded. The hind wings have the median vein "trifid," the male antennæ are pectinated and the palpi reach only about half way up the front. Dr. Barnes kindly communicated to me examples of this rare species.

Plusia is a typical Noctuid genus, belonging to the "quadrifinæ." Tongue developed, eyes naked, cell of hind wings normal. The thorax has a large spreading tuft and the abdomen is tufted basally. Front without prominent tubercle; ♂ antennæ ciliate. The following groups, some of which are of generic rank, may be recognized.

- Palpi considerably exceeding the vertex of head.
  - Palpi upturned, evenly haired, third joint large, blade-like.
    - External margin even ....**Polychrysia.**

External margin falcate below apex.................................**Panchrysia.**
Palpi obliquely ascending, second joint tufted below.
Wings narrow with a scale tooth at tornus..................**Eosphoropteryx.**
Palpi upturned, not, or but little exceeding vertex.
Outer margin falcate; a scale tooth at tornus....................................**Plusia.**
Outer margin even.
Eyes normal.
Outer margin crenulate; a moderate tooth at tornus......**Autographa.**
Outer margin entire; scarcely any tooth at tornus.............**Euchalcia.**
Eyes small, narrow...**Syngrapha.**

Genus **Polychrysia** *Hübn.*

Hübner, Verz. bek. Schmett., 251, 1816. Type *moneta* Fabr.

"Die Schwingen mit einen ansehnlichen silbernen Mittzeichen bemerkt, fast gans gölden oder silbern scheinend, braunschattig angelegt."

Hübner thus describes the genus, using colorational characters only. *Moneta* is mentioned, sole species and therefore type. The genus may be recognized by the characters given in the table. Of one of the American species, *Deva trabea* Smith, I may say that I am unable to differentiate it specifically from the European *moneta*. The other species, *formosa* Grt., has been discovered by Mr. Kearfott in the larval state. The genus *Chrysoptera* Latr., is synonymous.

Genus **Panchrysia** *Hübn.*

Hübner, Verz. bek. Schmett., 252, 1816. Type *deaurata* Esp.

"Die Schwingen unrichtig braun bezeichnet, ganz gölden und braunschattig angelegt."

Type and sole species *aurea* Hübn., = *deaurata* Esp.; *Deva* Walk. (Cat. Brit. Mus., XIV, 1791, 1858) is synonymous. The only American species referable, that I know, is *purpurigera* Walk.

Genus **Eosphoropteryx**, nov.

Palpi obliquely ascending, second and third joints straight, exceeding the head by nearly twice its length, second joint long haired below, third long, flattened. Wings elongate, inner margin excavate, a tuft of scales at tornus; outer margin convex, entire. A thick double tuft on thorax, spreading; a dorsal tuft on third abdominal segment.

Named in allusion to the pink color on the wings of the type and sole species, *thyatiroides* Guen.

Genus **Plusia** *Ochs.*

Ochsenheimer, Schmett. Eur., IV, 89, 1816. Type *chrysitis* Esp.

I follow Hampson in designating *chrysitis* as the type. *Agrapha* Hübn., of which *ærea* may be considered type, and *Diachrysia* Hübn., are synonyms. *Diachrysia* contains eight species in Hübner's work, but they appear congeneric and *orichalcea* Fab., the second species mentioned, may be regarded as the type. Four American species are referable here.

Genus **Autographa** *Hübn.*

Hübner, Verz. bek. Schmett., 251, 1816. Type *gutta* Guen.

"Die Schwingen mit goldenen oder sibernen Schriftzeichen geziert und metallisch glänzend gefärbt."

Thirteen species are mentioned. The first species, *parilis*, is not congeneric with the others. Therefore I have taken the second species as type, *circumflexa* Hübn., (nec Linn.) = *gutta* Guen., a species practically identical with the American *simplex*. Under this restriction *Chrysodeixia* Hübn., type *chalcites* Esp., is synonymous. *Chrysaspidia* Hübn. may be likewise referred here. The majority of the American Plusias fall in this genus.

P. abrota Druce, described from Mexico, but now recorded from Florida, falls here. It differs in the enormously developed abdominal hairs; but these are not improbably a secondary sexual character of the male. *Brassicæ* has remarkably developed lateral tufts in the male and *verruca* and *oxygramma* have smaller ones. In the other species this character is not marked. *Snowi*, *sackeni* and *diasema* have yellow secondaries, but agree in the shape of the eyes with this genus.

Genus **Euchalcia** *Hübn.*

Hübner, Verz. bek. Schmett., 251, 1816. Type *illustris* Fab.

"Die Schwingen mit blassen Zeichnen bemerkt, erbunt gefärbt."

Hübner mentions three species, of which the first, *illustris* Fab., may be considered the type. The European *festucæ* may be referred here also. The allied American forms, *contexta*, *putnami* and *striatella* will come here and *Deva ornata* Ottol., also. This latter has the aspect of a *Basilodes*, but lacks the frontal tubercle. It does not seem structurally different from *Euchalcia*.

Genus **Syngrapha** *Hübn.*

Hübner, Verz. bek. Schmett., 250, 1816. Type *hochenwarthi* Hoch.

"Die Schwingen mit metallglänzenweisen Schriftzeichen bemerkt, die Senken gelb gefarbt."

Hübner includes three species under this definition. The first, *ain* Hübn., is not congeneric with the others, being referable to *Autographa*. I have therefore regarded the second, *divergens* Fab., = *hochenwarthi* Hoch., as the type. Under this restriction *Caloplusia* Smith is synonymous. The restriction was made by Guenée (Spec. Gen., VI, 355) in 1852, who excluded *ain* from his section *Syngrapha*. Hübner evidently intended to include all the yellow hind-winged Plusias in *Syngrapha*, but this group can not be structurally defined.

◆

CONTRIBUTIONS TO THE KNOWLEDGE OF NORTH AMERICAN ARCTIIDÆ.—III.

(PLATE XI.)

BY OTTO SEIFERT.

Arctia radians *Walker*.

Apantesis radians WALKER, Cat. Lep. Het., pt. III, 1855, p. 632 (female).

Arctia phalerata var. *incompleta* BUTLER, Ann. Mag. Nat. Hist., Vol. VIII, 5th Ser., 1881, p. 311 (male).

Several *Arctia* larvæ were found hidden under boards during the daytime in rich hammock clearings at Island Grove, Florida, in different stages of development from the beginning of March to the middle of May. The larvæ were velvety black with a dorsal chain of milk-white spots and with reddish subventral hairs. They were fed with what appeared to be a variety of *Taraxacum*. First pupa obtained May 8th transformed to imago (♀) May 18th. Exposed at the hammock clearing, the ♀ was found with a ♂ the next morning and deposited eggs at once. These were taken to New York City, May 20th.

Eggs.—"Obtuse cones," light straw color with rather bright, apparently smooth surface, the fine reticulations only visible when magnified. Diameter at base about 0.65 mm. At the time of exposure the temperature at Island Grove was about 37° C. On arrival in New York the weather was continuously rainy and cold, almost without exception, the thermometer vacillating between 13° C. and 18° C. till nearly June. June 1st, early in the morning the young larvæ left their egg-shells of which they ate the larger part and remained idly for hours near the remnants of the iridescent membranes. The larvæ were reared to maturity on *Taraxacum taraxacum* and *Plantago major*, with occasionally some lettuce leaves. Structurally they do not deviate from the other larvæ of the group, the arrangement and development of warts and bristles being normal. (G. H. French, Papilio, Vol. II, p. 176, 1882; A. Gibson, Can. Ent., Vol. XXXII, p. 369, 1900.)

Stage I.—The newly hatched larvæ are semitransparent, of a sordid yellowish-white with black warts. The head jet black, sparsely hairy; clypeus, epistoma, and mouth parts sordid whitish, the latter tipped with brown. Hairs emitted singly from the warts, rather long but even, except a few long projecting hairs from the anal segment; legs concolorous with body.

The singular variability of the young larvæ during growth in the first stage, which makes them appear all shades from amber color and smoky greenish to sordid white, seems to have its cause in the irregular accumulation of pigment around the bases of the warts.

Stage II.—Right after moulting the larvæ attain an average length of 3.5 mm. when resting, measured from head to anal feet. Width of head 0.6 mm. A white dorsal stripe, narrow on thoracic segments, widening and attenuated in the middle of abdominal somites, and the stellate uneven bristles on the warts are the most important features obtained at this stage. The opaque white dorsal stripe is only partly present on the prothoracic segment; narrow and even on second and third thoracic and anal segments; the abdominal somites, except the last one, have the stripe rather narrowed anteriorly owing to its evading the bases of the minute subdorsal warts (i), but extending posteriorly to the large subdorsal ones (ii) (Dyar, Entom. Amer., Vol. VI, p. 74, 1890) and narrowing again near suture of somite. The bases of warts i and ii are brownish, the brown shades spreading and uniting to form a brownish band or area, less developed on the thoracic segments; below this lateral area the color is uniformly sooty grayish, amber, or dusky green, only the summits of the warts blackish, their bases dusky orange. The hair on anterior warts of first segment is turned over the upper part of head.

Stage III.—After the second moult the larvæ attain an average length of 7.5 mm. when resting; width of head 0.9 mm. No material changes have taken place, but the colors are more intensified. Subdorsal warts bright black from their bases. The whole space below lateral area dusky orange, sutures of suprastigmatal region more or less shaded with bright reddish-brown. Bristles diverging in stellate groups, of uneven length; those of warts i and ii black; the other warts have the larger bristles black, the smaller ones whitish. Thoracic legs brown, abdominal ones concolorous with body; venter sooty olive.

Stage IV.—Pronounced changes are only in size and the more marked colors. Average length of larvæ 1.25 cm.; width of head 1.5 mm. The white band is inclined to separate into spindle-shaped spots. Lateral area dull brown; below this brown zone dusky amber to obscured orange. Warts black, shiny; bristles on stigmatal tubercles and below grayish with a few black ones.

Stage V.—During this stage the larvæ attain an average length of 2.2 cm. when resting. Width of head 1.8 mm.; width of third and fourth segments 4 mm. Head black, polished; setæ of various length, sparse; epistoma, mouth parts and antennæ sordid whitish, the latter tipped with black. Neck pale reddish-brown. Body subdorsally and laterally more or less dark dull brown, with black tubercles and bristles; space below sooty-amber, variable in shade, warts black.

Bristles of stigmatal warts and downward pale rust-red as is also the hair bent over vertex of head. The dorsal white band is separated into spindle-shaped or rounded spots, which in some individuals become obscured. Stigmata elliptical, deep ochre with black rim. Thoracic legs black, prolegs blackish above; feet ochre.

Stage VI.—Average length of larvæ 3.0 cm.; width of head 2.5 mm. In general the whole area above stigmata is deep velvety black; warts bright with black bristles. A row of prominent, mostly rounded, spindle-shaped or even diamond-shaped white spots, from first to seventh abdominal somites; no spot or trace of one on the prothoracic or anal segments. On second, third and eleventh somites, the white color is reduced to dots or a narrow line. Some of the larvæ have the white spots much obscured and dusky. In a few they are dark slate-colored or scarcely traceable at all. Below the stigmata to the pedal line the color is dull coffee-brown and the bristles as well as those overshading the head are more or less rust-red. Thoracic legs black, joints within greenish-white; prolegs dull pale blackish.

With some of the larvæ the stigmatal and suprastigmatal areas appear almost banded. This has its cause apparently in the insufficiency of dark pigment spreading from the bases of the warts, the dusky amber or orange color of the skin being not entirely overcome.

Stage VII.—Length of larvæ when resting about 3.2 cm.; when in motion 3.5 cm.; width of head 3.0 mm.; width of eighth segment 6.5 mm. Head shiny black, setæ of uneven length, sparse. Epistoma and bases of antennæ sordid greenish-white, tips black. Neck reddish-brown. Dorsal, subdorsal and lateral regions of body velvety black with bright warts. With about 65 per cent. of the larvæ a dorsal row of more or less rounded milk-white spots is present, most pronounced from the fourth to tenth segments, usually narrowed to a fine line on second, third and eleventh segments, always absent on first and twelfth. Below the lateral area the color is a dull, smoky coffee-brown, almost greasy looking; the rows of tubercles and their bases dull black. Stigmata elliptic, narrow, deep ochre with black rim. Venter dull dark brown. Thoracic legs black, bright; within the joints greenish-white, prolegs dull blackish. Bristles of uneven length rather short and stiff, black above the spiracles, reddish from the stigmatal warts downwards, also those anteriorly on first segment covering upper part of head.

About 35 per cent. of the larvæ have the white dorsal spots more or less obscured, some (about 10 per cent. of the brood) have the spots entirely obliterated.

The larvæ before pupating exude moisture and if well fed and kept in roomy cages they form a voluminous, moist but loose cocoon, mostly between leaves and soon transform to pupæ. These quickly turn from pale yellow to orange, reddish-brown and maroon, often covered with a light bluish bloom. Many of the pupæ remain this way, but many deviate remarkably in color. Pupæ formed at the same time vary from uniform reddish-brown shades to reddish-brown with dark brown wing cases; often they are evenly dark brown or with lighter segmental joints; stigmata of the lighter-colored pupæ dark brown. Thoracic segments and sheaths of limbs rather rugose; immovable segments wrinkled and densely punctured, movable ones finely punctured anteriorly, bright and smooth posteriorly. On the vertex just above the eyes are two patches of short, even, knobbed bristles, similar to those forming a brush-like bunch at cremaster. Above spiracles to dorsum the pupa is partly covered with patches of very short even hair, like all the species of this group.

The ♀♀ imagines appear first, early in the morning; the ♂♂ following soon; the latter when disturbed emit (like all the *Euprepia*) a clear, greenish liquid near the patagia which has a decided "citronella"-like smell.

Eggs deposited in Florida May 20th, hatched June 1st, first pupæ July 1st, imagines July 12th.

Eggs of two broods obtained in New York from the moths bred from the Florida brood on July 15th hatched July 21; pupated August 22d; first imagines September 5th. Stragglers not taken into consideration, the time from depositing of eggs to imago state during the warm months was 50 days. The variability in size of the pupæ finds its cause in the sexes; three pupæ measured: Length 1.65, 1.8, 1.9 cm.; width of fourth to sixth segment 5.0, 5.5, 6.5 mm.

The imagines were at first considered to be a variety of *Arctia vittata*. Twenty-five freshly emerged ♀ ♀ were successively exposed at Rutherford, New Jersey, at such places where *A. naïs, phalerata* and *vittata* are found; females were also exposed on Staten Island during the season, but none of these found mates. Twelve ♀ ♀ more were sacrificed in this experiment on wooded lawns and meadows in Bronx and at West Farms, where *A. vittata* is positively to be found, and six on Long Island—but always without favŏrable result; they did not attract their own kind near New York.

About 500 perfect specimens of the three broods were examined. It led to the conclusion that they are neither *naïs, phalerata* nor true *vittata*. The very constant ♀ ♀ approach *vittata* closely, but the black color on the abdomen is never so prevailing as with *vittata* and the secondaries are always red. The very variable ♂ ♂ are nearest to *naïs* (♂), were it not for the unchangeable pale costa and the usually unbroken marginal band on secondaries. Out of the entire number of specimens obtained only one, a ♀, has the costal margin nearly edged by a fine black line, but the black color does not reach the root of the wing. All the rest have the yellowish costal stripe extended to the edge.

The comparison of 212 ♂ ♂ and 212 ♀ ♀ obtained from the three broods of the Florida form shows the following results, relative to the other forms of the group:

Males.

⋧ mark complete	none.
⋧ mark indicated or partly present	16.
Without trace of ⋧ mark	196.
Black marginal band on secondaries disconnected or brŏken into spots	85.
Marginal band on secondaries entire	127.
Hind wings red with black maculation	none.
Hind wings ochre, profusely suffused with red, sometimes red prevailing	212.
Hind wings plain yellow or ochre	none.

The more obsolete the maculation on secondaries, the more is the tendency to form a ≥ mark on primaries and to widen the longitudinal bands. The discal spot is usually obliterated where the black band is broken into spots.

Females.

≥ mark or traces of if present	none.
Marginal bands on secondaries broken	none.
Secondaries yellow, ochre or suffused with red	none.
Secondaries red with broad black marginal band	212.

Male.—Head, collar and thorax dull yellowish, collar with two black stripes or spots, often immaculate; thorax with three black stripes; abdomen above rather deep ochre, dorsally banded with black, the band most extended centrally, narrowed on last segment; the width of this band very variable. Head, thorax and abdomen below, also legs and antennæ black, only a few yellowish hairs near chest.

Primaries black with rather prominent yellowish-white fringes. Stripes pale ochre; costal stripe reaching transverse posterior band; the ochre color covering the edge of costa often to its whole length. The central longitudinal stripe unites with transverse posterior band and both terminate; the former sending off a more or less extended submedian dart or streak, often forked at the end, towards inner angle. Interior margin bordered with an ochre stripe.

Secondaries ochre, rarely very pale, the ochre mostly suffused with deep salmon or reddish, the latter often prevailing, always most intense near inner margin. Costal region blackish, the black deepening and extending at apex, forming a broad marginal band indented below apex and never reaching anal angle. Fringes as on fore wings. The black marginal band is subject to reduction into spots; rarely reduced to an apical spot and costal margin only. This reduction is generally accompanied by an extension of the submedian stripe on primaries to the inner angle and an attempt to produce a ≥ mark.

Female.—Head, collar and thorax as with ♂; abdomen black below, above varying from red to ochre, interspersed with reddish hairs; dorsally banded with black to tip of abdomen. This band is sometimes of uniform width, but usually attenuated in the middle, very rarely filling dorsal and lateral space so as to leave only a narrow reddish stripe above the confluent, tooth-like black bands below. Fringes of wings less prominent than with ♂.

Primaries black, only costal and central longitudinal stripes present, the transverse posterior band fused with the longitudinal bands. The ochre-colored costal stripe beyond transverse posterior band is limited to the extreme edge of costa only, never reaching apex. Often the transverse posterior band is only rudimentary or is lacking altogether. The central longitudinal stripe, never extending beyond the costal stripe, inclines to send off a short submedian streak, thus getting forked at the end. Interior margin bordered by a dull ochre stripe.

Secondaries rather bright red. Costal region blackish, expanding at apex to a broad black band reaching to inner angle. The band is variable in its width and sometimes the black extends beyond the rather prominent discal spot, leaving only a limited red space near root of wing.

The more produced the stripes on primaries, the more reduced is the marginal band on secondaries, and with those individuals where the bands on primaries are only represented by short streaks, the black on hind wings extends from the costal margin and encloses the discal spot, leaving less than a third of the wing red.

The size of the more typical individuals is in both sexes rather constant, varying from 3.7 to 3.5 cm. The aberrative forms (♂) are in general behind this size, never expanding more than 3.5 cm.; dwarfed specimens of both sexes 2.7 (♂♂) and 3.0 (♀♀) cm. respectively.

This moth has been by no means unknown. Several specimens were collected by Mrs. Slosson in Florida. Perhaps all the ♀♀ obtained from the South have been referred to *A. vittata* Fabr., while the males, according to their appearance, were considered as varieties of *naïs*, *phalerata* or *vittata*.*

Walker's description of *Apantesis radians* ♀ agrees with figures 20 and 21, and Butler's description of *Arctia phalerata* var. *incompleta* ♂, agrees with figures 13, 14 and 15.

Several of the first imagines obtained with some of the larvæ were sent to Dr. H. G. Dyar as possibly *A. vittata*, but his opinion was that they were neither "true *vittata*" nor "true *phalerata*."

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* Besides the seven specimens which Mr. Seifert kindly gave me, the U. S. National Museum has eight specimens of a brood from Archer, Florida, bred by A. Koebele (Dept. Agr., 2587), one female bred by Riley in Missouri (No. 126 L), and two females captured in Washington, D. C., also a female with thinly scaled hind wings, from Miami, Florida. This form is by far nearest to *A. phalerata* Harr., and differs therefrom only in the greater extension of the black markings. It may not be possible to determine whether it was *radians* or *decorata* that served Fabrician as the basis of his diagnosis of *vittata*, but it seems nearly certain that it is Walker's *radians* in the British Museum.—HARRISON G. DYAR.

From *naïs* this form is separated easily, notwithstanding the extraordinary resemblance of some of the aberrative forms of both sexes, by the costal black line of the former.

The great majority of *A. phalerata* have a broad and well-developed ≳ mark reaching from costal edge to inner margin and the normal longitudinal stripes are not subject to notable change. In three broods of this southern form there were not a dozen with a ≳ mark and then it was of slender design, never reaching the costa, but the upper arm forming a hook.

Arctia vittata Fabr., is a more robust moth. The abdomen of the female is nearly black, the hind wings red or yellow with a broad marginal band. The males of "*vittata*" have an incomplete ≳ mark, rarely reaching the costa, the marginal band on secondaries is mostly broken up into spots. A singular (perhaps atavistic) aberrative form of *vittata* occurred throughout a whole brood (Long Island); all the males having a complete, diaphanous, marginal band on secondaries, destitute of scales, only edged above with dull blackish.

EXPLANATION OF PLATE XI.

Arctia radians WALKER.

Numbers 1 to 16 include all the varieties of the males.

1, 2, 3 are individuals of the typical form. 4 to 11 show the gradual breaking up of the marginal band and development of longitudinal stripes.

12 to 16 are the rare forms with most complete ≳ mark.

16, with almost immaculate hind wings showing the incapacity to complete the ≳ mark; rather tending to widen the longitudinal bands.

17, is the normal female form. (The specimen from which this figure has been taken does not have a black costa.) 18, 19, 20 and 21 are examples deviating from the normal forms.

NOTES ON NORTH AMERICAN TINEINA.

(PLATE XII.)

BY AUGUST BUSCK,

U. S. Department of Agriculture, Washington, D. C.

Helice *Chambers.*

Chambers characterized this genus (Can. Ent., V, 188) with *pallidochrella* Chambers, as type, thus:

This genus and the species on which I have founded it approaches *Trypanisma* Clemens, *Gelechia difficilisella* and more remotely *Agnippe* and *Evippe*. Wings horizontal in repose, primaries lanceolate; the costal attains the margin before the middle; the subcostal sends to the costal margin two branches before the end of the cell, one from the end, another behind it and becomes furcate before the tip, delivering a branch to each margin. Cell narrow, closed by a short oblique and faint discal vein. The median sends a branch to the dorsal margin and becomes furcate behind it. Submedian furcate at base. Secondaries narrower than the primaries, apex long and sharply pointed with the posterior margin suddenly and deeply incised beneath it and the anal angle rounded; costa emarginate from the middle to the apex. The costal vein attains the margin about the middle. Subcostal straight, attaining the margin just before the tip. Median dividing into three branches. Cell unclosed. * * * Tongue scaled, longer than the anterior coxæ. Maxillary palpi small, but distinct under the lens; labial palpi long, slender, overarching the vertex, with the third joint almost acicular and longer than the two others united; the second joint is laterally slightly compressed and slightly thickened towards its apex. Antennæ simple, about two thirds as long as the wings. Head and face smooth. Vertex short and face scarcely retreating."

This characterization would necessarily, as Chambers says, make *Helice* a Gelechiid genus.

Several times later Chambers compared *Helice* with the narrow-winged Gelechiid genera *Trypanisma* Clemens, *Evippe* Chambers and *Agnippe* Chambers, and in one place (Can. Ent., V, 230) he emphasized the family character in separating it from *Eidothea* Chambers, stating that "the hind wing is even more excised beneath the tip" than in that genus. Again (Can. Ent., VII, 106) he says:

> "*Sinoë* and *Helice* and *Agnippe* resemble *Laverna* in having raised tufts of scales on their wings" and (Can. Ent., IX, 231–232).* "This species (*Helice pallidochrella*) will be considered—and is—a *Gelechia* in the wide sense—the sense in which it is a convenient receptacle for every species that cannot be better disposed of. And as I had previously described a very different species as *G. pallidochrella*.† I suggest for this species the specific name *gleditschiella*."‡

Thus, far in the definition and comprehension of this genus, Chambers was not only right, but unusually clear and full in his characterization.

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* This reference was evidently overlooked by Lord Walsingham when he wrote his article in 1882. (Trans. Amer. Ent. Soc., pp. 188–189.)

† This species, described as *Depressaria pallidochrella* (Can. Ent., IV, 126) and mentioned (l. c., 129 and 147; Bull. Geo. Surv., IV, 138; Smith's List Lep. Bor. Amer., No. 5272) is an entirely different thing and belongs in the germs *Gnorimoschema* Busck. (Proc. U. S. Nat. Mus., XXV, 1902.)

‡ This change of name is inadmissible when *Helice* is retained as a good genus and the type must be known under the original name *pallidochrella*.

But the trouble came when he sent out his "types." Then he mixed up his Gelechiid species with a most singularly similar Elachistid.

One of these latter, sent to Miss Murtfeldt as *Helice pallidochrella*, was before Lord Walsingham, when he wrote in 1882 (Trans. Am. Ent. Soc., X, 188): [*]

> "This is evidently the species described by Mr. Chambers under the above name (*Helice pallidochrella*), but some mistake has undoubtedly been made in the original description. Chambers writes of his genus *Helice* (Can. Ent., V, 188) 'secondaries narrower than the primaries; apex long and sharply pointed, with the posterior margin suddenly and deeply incised beneath it and the anal angle rounded.' In Can. Ent., VII, 106, Mr. Chambers states that '*Sinoë*, *Helice* and *Agnippe* resemble *Laverna* in having raised tufts of scales on their wings.'
>
> The specimen before me (Mr. Chambers' own specimen from Miss Murtfeldt's collection), has the hind wing narrow and evenly attenuated from near the base, not incised below the apex and it has no signs of any raised tufts of scales on the fore-wings. Mr. Chambers probably placed it in the genus *Gelechia* under the name of *Gelechia gleditschiælla* (Index, p. 144), having regard to the description which he had given of the form of the hind wings; but lacking this character it is not a true *Gelechia*."

Another of these supposed types was sent to the U. S. National Museum, where it is now supplied with Chambers' handwritten label and the regular red museum type label No. 454. This is like the specimen which Lord Walsingham had before him, has evenly attenuated hind wings, not excised below apex and it has no trace of raised scale tufts on the fore wing. It is an Elachistid.

Two other specimens, received by Miss Murtfeldt from Chambers, and now in Professor Fernald's collection, are also this same Elachistid, wrongly labeled *Helice pallidochrella*, and one other such Elachistid is in the National Museum, determined by Lord Walsingham and labeled in his handwriting: *Helice pallidochrella*.

With all this evidence and with the actual acknowledgement of fault by Chambers himself in his reply to Lord Walsingham [†] I had made up my mind that Lord Walsingham was right in saying that

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[*] This specimen with Lord Walsingham's blue label, No. 727, is now in the collection of Professor Fernald, where—through his kindness—I had the opportunity to examine it carefully in May, 1900.

[†] "The defect in the description of the hind wing, to which Lord Walsingham calls attention, may exist and may have been caused (as I have known similar mistakes in other cases) by a slight fold or wrinkle under the tip. I have an indistinct recollection that I observed something of this in this species" (Chambers, Can. Ent., XV, 95, 1883).

Chambers had made a mistake in his original description, the more so as not only does the specific description of *Helice pallidochrella* fit those "types," but even the description of the venation might be construed so as to fit very nearly, as will be seen by comparing it with my delineation, made from the U. S. National Museum type no. 454 (Pl. XII, Fig. 2).

Happily I had the opportunity in May, 1900, to go to the Museum of Comparative Zoölogy at Cambridge, Mass., for the purpose of studying Chambers' and Zeller's types. There I found twenty-four specimens, labeled in Chambers' handwriting: *Helice pallidochrella*.

Of these, which all seem to be alike superficially, fifteen are true Gelechiidæ and unquestionably represent Chambers' *Helice pallidochrella*. The others are the same as the "types" in the United States National Museum and Professor Fernald's (Miss Murtfeldt's) collection and represent an undescribed Elachistid species, forming a new genus, erected for it below.

The genus *Helice* then must be retained as a good genus in the family Gelechiidæ with the following interesting venation: Fore wing: 11 veins, 5 absent, 7 and 8 out of 6, 3 and 4 stalked. Hind wing under I, apex produced, termen emarginate, anal angle rounded, 6 veins, 5 and 6 absent, 3 and 4 stalked. (Plate XII, Fig. 1.)

True types of this are found only in the Cambridge Museum and in the United States National Museum (type no. 6257), which has obtained one through the courtesy of Mr. Samuel Henshaw. The supposed types in Professor Fernald's collection and in Cambridge may be regarded as cotypes of a new genus and species, *Cacelice permolestella*, described below, the type of which is in the United States National Museum (No. 454), hitherto supposed to represent Chambers' species.

An examination of the figures 1 and 2 on Plate XII will explain the very natural confusion of these strangely similar insects, belonging to two different families. A similarity, so marked as to tempt the student to infer one being a development from or another sex of the other, while they in reality have an entirely different origin. The similarity may be a result of common surroundings, food plants, enemies, or other more subtle reasons.

Nothing definitely is known of the larval history of these two species, but Chambers found them on honey locust (*Gleditschia tricanthos*) and supposed that his species fed in some way on this tree, possibly in the seed pods. It is likely that both species will be found to have a common food plant.

In J. B. Smith's list of Lepidoptera of Boreal America, Professor Riley placed *pallidochrella* as a synonym of *glandiferella* Zeller = *sella* Chambers (No. 5302) at the same time repeating *pallidochrella* as a separate species under No. 5439.

There is no apparent reason for this synonymy from the entirely different descriptions, the less so, as Chambers, when he pronounced *sella* Chambers a synonym of *glandiferella* Zeller (Can. Ent., IX, 14) right below gives some notes on *pallidochrella*, without mentioning the resemblance. That there is a slight general resemblance is true, but that is all, and the two are generically different.

This is also remarked upon by Lord Walsingham (Proc. Zoo. Soc. Lond., 72, 1897), and there he adds:

> "Although it is obvious that *pallidochrella* is closely allied to *glandiferella*, I am not quite convinced, that it is synonymous with it."

It is evident that Lord Walsingham must have had some additional knowledge of *Helice* Chambers at this time, as the statement is in direct contradiction to his earlier opinion quoted above.

Cacelice, gen. nov. (Elachistidæ.)

Type: *permolestella* Busck. Antennæ four-fifths, rather stout, simple; labial palpi long, smooth, recurved, pointed, terminal joint as long as second.

Fore wings elongate ovate, pointed; 10 veins, 3 and 4 stalked, 5 absent, 6 and 7 stalked, embracing apex, 8 absent, 1*b* furcate at base. Hind wings narrow, lanceolate, pointed; 6 veins, 5 and 6 absent, cell open between 7 and the stalked veins 3 and 4, 7 subobsolete towards base Posterior tibiæ with sparse, long hairs above.

Cacelice permolestella, sp. nov. (Pl. XII, Fig. 2.)

Helice pallidochrella WALSINGHAM, Trans. Amer. Ent. Soc. Phil., X, 188, 1882.

Antennæ dark purplish-brown, nearly black, with a longitudinal line of silvery white dots in front, one on each joint; first joint long purplish-white.* Labial palpi purplish-white, dusted with dark fuscous. Head, thorax and fore wings light reddish-gray, minutely dusted with dark purplish fuscous scales. Near base is an inconspicuous, small, dark, bronzy brown, costal dot.† At basal third is a large transverse dark bronzy-brown costal spot, reaching down across the fold;‡ at about the apical third is a smaller concolorous costal spot and the tip of the wing has the dark scales collected into ill-defined transverse spots or streaks. Cilia reddish-gray, dusted with dark scales. Hind wings shining, dark fuscous; cilia a shade lighter. Legs silvery, strongly shaded on the outside with dark purple. Alar expanse 10 mm.*

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* This same ornamention is found in *Helice pallidochrella*.

† Also found in *Helice pallidochrella*, but not mentioned by Chambers

‡ This spot is narrower and more pointed than the corresponding costal spot in *Helice pallidochrella*.

Habitat: Kentucky. Collector, V. T. Chambers. United States National Museum type No. 454, formerly supposed to be the type of *Helice pallidochrella*.

Eumeyrickia, gen. nov. (Œcophoridæ.) (Pl. XII, Fig. 3).

Type: *Chætochilus trimaculellus* Fitch.

Antennæ a little more than half as long as fore wings, evenly ciliated, 1, throughout except the basal joint, which is long and smooth, without pecten. Labial palpi as in the genus *Ypsolophus*, second joint with a long dense projecting pointed tuft beneath, terminal joint erect, slender, pointed, markedly longer than second joint. Head somewhat loosely scaled. Fore wings three times as long as broad, apex pointed, termen oblique; 12 veins, 7 and 8 stalked, 7 to termen just below apex, 2 from before angle of cell. Hind wings ovate, nearly I; venation typically œcophorid, 8 veins: 3 and 4 connate, 6 and 7 parallel. Hind tibiæ rough haired. Both males and females winged; female with protruding horny ovipositor.

This interesting genus is named in honor of Dr. Edward Meyrick, of England, the authority on the Œcophoridæ, who has most liberally extended his help to the author through a long series of highly prized letters.

I sent him a specimen and delineation of the present species, asking him whether it might be placed in any of his numerous Australian œcophorid genera. In his answer he says:

> "I have no hesitation in regarding this as a new genus of Œcophoridæ. It is allied, I think, generally to the *Pleurota* group and in my tabulation would come near *Atheropla*, but I think it not really very near to any genus that I know; from those with most similar characters it differs by the absence of antennal pecten and also particularly by the terminal joint of palpi being longer than the second, which is quite exceptional in the Œcophoridæ."

Eumeyrickia trimaculella *Fitch.*

Chæthochilus trimaculella FITCH, Rep. Nox. Ins., II, 233, 1856.

Ypsolophus trimaculellus CHAMBERS, Bull. Geo. Surv., IV, 167, 1878; RILEY, Smith, List Lep. Bor. Am., No. 5532, 1891.

Anarsia? albapulvella CHAMBERS, Can. Ent., VII, 147, 1875.

Chimabache? haustellata WALSINGHAM, Trans. Am. Ent. Soc. Phila., X, 173, 1882; RILEY, Smith List Lep. Bor. Am., No. 5209, 1891.

Fortunately I have been able to study the types of all three authors. Fitch's type in good condition and with his own large label attached is in the collection of the U. S. National Museum. Chambers' unique type was deposited in the Belanger collection, Université Laval, Quebec, Canada, and through the kindness of the present curator, Rev. Dr. C. E. Dionne, I secured last year this together with all others of Chambers' types found there, with his original labels attached. It is now in the U. S. National Museum under the type number 5768. Finally I have studied Lord Walsingham's type in the collection of Professor Fernald and through his kindness secured for the National Museum one specimen, identical with the type and from the same locality, Orono, Maine.

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* *Helice pallidochrella* is slightly larger, 10.5–11 mm; Chambers' measure, ⅕ inch, is too small.

Without these good opportunities I hardly should have been able to make out this synoynmy, but once it is known, it is easily substantiated by the three careful descriptions.

Besides the types I have seen other specimens from the following localities: Pennsylvania, New York, Maine and eastern Canada.

Babaiaxa, gen. nov. (Pl. XII, Fig. 4.)

Type: *Psecadia delliella* Fernald.

Antennæ three-fourths, simple, slightly pubescent, basal joint without pecten. Labial palpi slender, smooth, curved, reaching vertex, terminal joint pointed, half as long as second joint. Tongue stout, basal part scaled; face, head and thorax smooth. Fore wings elongate, three times as long as broad, costal and dorsal edges nearly straight, parallel, apex obtusely pointed. 12 veins, 7 and 8 stalked to costa, rest separate, 1b furcate at base. Hind wings as broad as fore wings, elongate-ovate; 8 veins, vein 8 is connected at the end of the cell with 7 by an oblique cross vein and basal part of vein 7 is obsolete, so that the upper side of the cell is formed not as usual by the subcostal vein (7), but by the costal vein (8), and the cell thus actually emits 7 veins; veins 7 and 6 are parallel, 5 nearest to 6, 3 and 4 connate, internal veins [folds] to below 7 and to 6. Hind tibiæ rough-haired above, middle and terminal spurs well developed.

The very peculiar venation of the hind wing is, so far as I know, unique in the Tineina, to which group this genus surely belongs, and does not conform with the present definitions of any of the families, except it be the Gelechiidæ.

I am quite uncertain about the true relationship of this form and record its characters mainly in order to learn the opinions of other workers.

Babaiaxa delliella *Fernald.*

Psecadia delliella FERNALD, Can. Ent., XXIII, 29, 1891; RILEY, Smith, List Lep. Bor. Amer., No. 5235, 1891.

I have examined the type of this striking species in Professor Fernald's collection. The U. S. National Museum possesses specimen, determined by Professor Fernald and also fine specimens, collected by Mr. E. A. Schwarz.

Habitat: Texas.

Blastobasis *Zeller.*

As remarked by Lord Walsingham (Proc. Zoo. Soc. Lond., 91, 1897) the species placed in this genus in American lists do not conform with the type species (*phycidella* Zeller) in neuration.

There is one exception to this, namely *sciaphiella* Zeller, which together with *Blastobasis guilandinæ* Busck (Proc. U. S. Nat. Museum, XXXIII, 234, Plate I, Fig. 9, 1900), are the species at present described from this continent, which properly belong in *Blastobasis.*

I have, however, other bred species of *Blastobasis;* but as Lord Walsingham has a monograph of this group nearly ready, I shall not at present describe them. Until this monograph appears, the other supposed species of *Blastobasis* may temporarily be placed in Clemens's genus *Holcocera,* to which most of the species truly belong.

To the latter genus should also be transferred the "fringed-wing applebud moth," *Nothris? maligemmella* Murtfeldt (Mo. Agr. Exp. Sta. Bull., No. 42, 1898) a type of which (No. 4017), received from Mr. J. M. Stedman, is in the National Museum. It is possible that this on further study will be found synonymous with one of the previously described species. Fig. 5 on Plate XII is a delineation of the venation of this species made from the type.

Martyringa, gen nov. (Yponomeutidæ.) (Plate XII, Fig. 6.)

Type: *Œgoconia latipennis* Walsingham.

Antennæ stout, compressed, with the lower edge serrate. Labial palpi long, recurved; second joint slightly thickened and slightly rough beneath; terminal joint as long as second, slender pointed. Maxillary palpi small, porrected. Tongue well developed, scaled in its entire length. Face, head and thorax smooth. Fore wings elongated, more than three times as long as broad, apex rounded; 11 veins, 2 and 3 stalked, 5 absent, 8 and 9 out of 7 to termen just below apex. Hind wings as broad as fore wings, 7 veins; 4 absent, 3 and 5 connate, 6 and 7 parallel. Posterior tibiæ smooth.

This striking venation alone easily separates this genus from any described American one and I am unable to find any exotic genus like it. Among the American genera it comes nearest, though not very near, *Yponomeuta* Latreille.

Martyringa latipennis *Walsingham.*

Œgoconia latipennis WALSINGHAM, Trans. Amer. Ent. Soc. Phila., X, 190, 1882; RILEY, Smith, List Lep. Bor. Am., No. 5578, 1891.

This species was described from a single specimen in poor condition in the collection of the Philadelphia Academy of Nat. Sciences, which I have examined.

Mr. J. H. Durrant writes me that Lord Walsingham now has two specimens in his collection from North Carolina (Morrison).

In the U. S. National Museum is one good specimen, collected by Mr. F. C. Pratt at Travilah, Md., in July.

Plutella (?) **multimaculella** *Chambers.* (Plate XII, Fig. 8.)

Gelechia ? multimaculella CHAMBERS, Bull. U. S. Geo. Surv., IV, 89, 1878; HAGEN, Papilio, IV, 99, 1884; RILEY, Smith List, Lep. Bor. Am., No. 5414, 1891.

This insect is not a *Plutella* and is only placed temporarily in this genus. It will form a new genus in the Yponomeutidæ, but I prefer to obtain more ample material before establishing such.

My object in treating this and some of the other species mentioned in this paper, at this time is merely to get rid of them from the Gelechiidæ and place them at least in the family to which they belong, until special study of that family can dispose of them finally.

This in order that they can be included in Dr. Dyar's forthcoming Catalogue of North American Lepidoptera.

Gelechia ? multimaculella Chambers, has the following venation: Fore wings 11 veins; one of the dorsal veins (5?) absent; 8 and 9 out of 7, 7 to costa.

Hind wings 7 veins, 4 absent 5 and 6 stalked, 7 parallel with 6.

The labial palpi are smooth, both joints broad and flattened, terminal joint not pointed, shorter than second joint and erect.

Mompha sexnotella *Chambers.* (Plate XII, Fig. 7.)

Gelechia sexnotella CHAMBERS, Bull. U. S. Geol. Surv., IV, 88, 1878; HAGEN, Papilio, IV, 99, 1884; RILEY, Smith, List Lep. Bor. Am., No. 5482, 1891.

The unique type of this species is found in good condition and with Chambers' handwritten label on the pin in the Cambridge Museum of Comparative Zoölogy, where I studied it carefully in 1900.

It agrees well with Chambers' specific description, but it is an Elachistid and may provisionally at least be included in *Mompha* Hübner, though it differs from Meyrick's definition of this genus in having veins 6 and 7 of hind wings stalked.

In the National Museum is a series of this species, bred from galls on *Trichostema dichotomum* from Georgiana, Florida. Similar galls on the same plant are recorded in the notes of the Insectary, U. S. Department of Agriculture, from Virginia and Pennsylvania.

Cosmoptryx floridanella *Beutenmüller.*

C. nigrapunctella BUSCK.

Since describing this species I have seen several other specimens in various states of preservation and have more carefully examined Mr. Beutenmüller's type, United States National Museum type No. 496.

There is no doubt that it is the same species as *nigrapunctella*, the type of which is a perfect, fresh and glossy specimen, while *floridanella* was described from a flown and faded one.

Marmara *Clemens.*

While correcting my own mistakes I take the opportunity to call attention to a fault in my delineation of the wing of this genus (Proc. U. S. Nat. Mus., XXIII, Plate 1, Fig. 14, 1900), which through some unexplainable carelessness shows one costal vein more than it should, and more than my explanation of the venation on page 246 would indicate. This latter is correct.

Proleucoptera, gen. nov. (Tineidæ.)

Type: Leucoptera smilaciella Busck.

In the description of the above species (Journ. New York Ent. Soc., VIII, 244–246, 1900), I pointed out that its wing venation does not agree with that of the genus *Leucoptera*, but that it was included in this genus on account of its evident close relation to it in general characters and its identical life mode, larva and cocoon.

Dr. Edward Meyrick, to whom I have sent cotypes of nearly all species described by me, and who has favored me with kind criticism or remarks on all such, wrote me a year ago, the following comment on this species which I quote in full with his permission.

> "I am clearly of opinion that this (*Leucoptera smilaciella*) Busck should not be included in *Leucoptera*, but should form a new genus. It differs from *Leucoptera* in having the whole crown of the head tufted with rough hairs, whereas in *Leucoptera* the head is quite smooth and glossy, with only the back of the crown sometimes rough; and in possessing distinct, short, drooping palpi, whereas in *Leucoptera* these are obsolete.
>
> "These characters are constant in the European and Australian species of *Leucoptera*.
>
> "In the Australian and Malayan genus *Crobylophora* Meyrick, the head and palpi are quite as in your species and it would go there better than in *Leucoptera* (the

superficial characters of all three genera are very similar, viz., the white coloring, metallic tornal spot and radiated dark and yellow apical markings). But the venation of *Crobylophora* is very similar to that of *Leucoptera*, whereas your species possesses several additional veins in the fore wing, giving it quite a different aspect and showing that it is really a much earlier type and very interesting as probably approaching the ancestral form of both *Crobylophora* and *Leucoptera*. I think, then, that it would be a mistake to include it in either of these genera." (Letter of February 11, 1901.)

I agree thoroughly with Dr. Meyrick's view and propose the name *Proleucoptera* for this genus with *smilaciella* Busck as the type and with the following characters.

Face smooth, head tufted; antennæ 4/5, basal joint enlarged and concave beneath to form a well-developed eye-cap. Labial palpi short, but distinct, drooping.*

Maxillary palpi absent; posterior tibiæ hairy. Fore wings elongate-ovate, apex produced, pointed, but heavy scaling makes the wing appear broad and truncate. 10 veins, all separate, 1 *b* furcate at base, 4 absent, 7 to costa, 8 absent. Hind wings narrow, lanceolate; cilia 4; 6 veins 3 and 4 absent, cell open between 2 and 5. (See Fig. 6, Pl. IX, Jour. N. Y. Ent. Soc., Vol. VIII, 1900.)

A very interesting help to the understanding of the relationship between these genera is found in Chambers' *Cemiostoma albella*, a large series of which are in the U. S. National Museum, bred by Dr. Dyar and myself from leaf mines on cottonwood collected by Dr. Dyar in Colorado.

This insect, a specimen of which Stainton examined thirty years ago and which he unhesitatingly placed as congeneric with the superficially very similar European species of *Leucoptera*, forms a connecting link between *Proleucoptera* and *Crobylophora*. It has the characters of the head exactly like *Proleucoptera*, in which genus it should be placed (it is specifically difficult to separate from *smilaciella*), but the venation presents some specialization approaching the younger genera. Vein 11 is nearly obsolete, represented only by a slight process from the subcostal vein and a faint thickening of the membrane; vein 6 is emitted from 7 to termen and both veins 4 and 5 are absent; 1*b* furcate at base; transverse vein, as in *smilaiciella*, very indistinct especially between 7 and 9.

I would state that the two species of *Leucoptera* from Florida described by me, namely, *L. erythrinella* and *L. guettardella* (Proc. U. S. Nat. Mus., XXIII, 239–40) are true *Leucoptera*, conforming in every detail with the genus.

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* They were overlooked in the description of the species.

EXPLANATION OF PLATE XII.

Fig. 1. Venation of *Helice pallidochrella* CHAMBERS.
" 2. " " *Cacelice permolestella* BUSCK.
" 3. " " *Eumeyrickia trimaculella* FITCH.
" 4. " " *Babaiaxa deliella* FERNALD.
" 5. " " *Holcocera maligemmella* MURTFELDT.
" 6. " " *Martyringa latipennis* WALSINGHAM.
" 7. " " *Mompha sexnotella* CHAMBERS.
" 8. " " (*Plutella*) *multimaculella* CHAMBERS.

◆

TWO NEW GENERA OF BUNÆININE AFRICAN MOTHS.

By A. S. PACKARD.

The two genera here proposed are founded on species heretofore referred to the genus *Nudaurelia*. This latter genus is an African one, and was originally separated by Rothschild from the Asiatic and Australian genus *Antheræa*, with which the species were by the older authors confounded. As regards the adult or imaginal stages the Bunæinæ of the Ethiopian realm are convergent types closely mimicking the genuine Saturniidæ. Their larvæ are very spiny, and their subterranean pupæ, with their large cremasters, are sphingicampid in form and structure.

Acanthocampa, gen. nov.

Saturnia WESTWOOD, Proc. Zool. Soc. London, 1849, p. 41.

Antheræa WALKER, Cat. Lep. Het. Br. Mus., v, p. 1241. 1855.

Nudaurelia ROTHSCHILD, Novitates Zool., p. 41. 1895; Sonthonnax, Annales Lab. d'Études Soie, x, p. 24, 1900–1901.

Imago.—♂ and ♀. Head in front moderately wide, narrowing slightly toward the palpi; squamation not shaggy as in *Thyella*, but moderately close. Palpi depressed, reaching beyond the front, though they are short and small; the terminal hairs are long and are confused with those of the face; end of the palpi rather broad, the hairs uneven, so that the third joint can not be distinguished; when denuded (Fig. 4) they are seen to be small, 3-jointed, the second joint nearly twice as long as the first, and the third button-shaped, no longer than thick. Antennæ of ♂ subplumose, with 35 joints; well bipectinated nearly to the subfiliform tip, of which only the last six joints bear minute vestigial pectinations; the other pectinations are long, slender, only a little shorter than in *Thyella*, with long dense ciliæ.[*] Antennæ of ♀

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[*] "The male antennæ are 35-jointed with fifty-six rays on each side, the rays rather long; the two basal rays of each joint are obliquely porrected, so that the rays form four series instead of all being on the same plane" (Westwood).

with about 32 joints, subsimple, somewhat flattened, the longest branches two-thirds as long as the joints bearing them, and ending in two minute rather long setæ; the distal pectinations forming short stout teeth. Thorax moderately stout, not shaggy as in *Thyella;* there is a definite prothoracic collar.

Fore wings subfalcate, much as in *Thyella;* compared with those of *Thyella* very similar in shape, but differing in the costa being a little less arched or curved towards the apex, which is moderately acute, not so much so as in *Thyella;* outer edge slightly excavated; inner angle not so square as in *Thyella* and more rounded. Hind wings more rounded than in *Thyella;* the apex much more rounded; outer edge rounder, as is the inner angle. The abdomen reaches to the beginning on the inner edge of the hind wing of the extradiscal line.

FIG. 1.

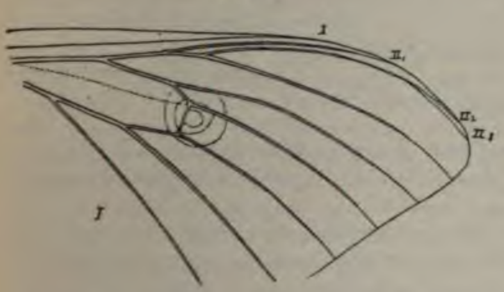
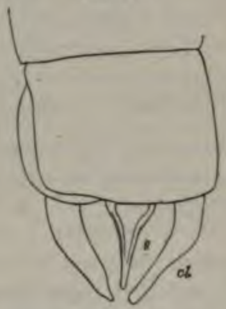


FIG. 2.



Acanthocampa belina. 1, venation of fore wing; 2, genitalia, dorsal view; *s*, suranal plate; *cl*, clasper.

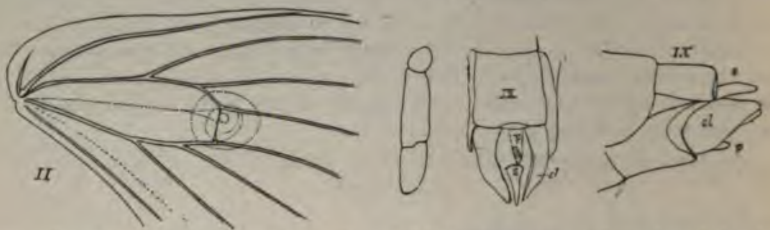
Venation (Fig. 1): vein II 2 present, as in *Thyella;* origin of veins II 1–3 much as in *Thyella* but situated a little farther out, the chief difference in the venation is in vein III 2 being independent, *i. e.*, moved towards the middle of the extradiscal cell, so that the discal veins are very short, not much more than half as long as in *Thyella*. As will be seen by reference to the figures the venation is very different from that of *Nudaurelia*. The same features are also seen in the hind wings (Fig. 3), the discal veins being very short, though the general proportions of the discal cell itself are much the same in *Thyella* and *Nudaurelia*.

Markings: ground color obscure grayish-yellow or light fawn; the ocellus on the fore wing small, that on the hind wing about three times as large; the clear space being oval, that of the fore wings small, hemispherical, or rather semiovate, or half-egg-like in outline. The lines are white, the basal line inclined to be zigzag and the extradiscal slightly scalloped, but not nearly so much so as in *Thyella;* in general the arrangement of the lines are much as in *Nudaurelia cytherea*. Body and inner edge of the hind wings not so shaggy and woolly as in *Thyella*.

Fore tibial odoriferous sack is very different from that of *Thyella*, being short, about two thirds as long as the tibia itself, and as wide, oval-lanceolate, flattened, not sharp at the end.

The fore tibiæ are short and thick, with dense hairs entirely concealing the odoriferous sack, but when denuded rather slender and only two thirds as long as in *Thyella;* they end dorsally in two slender spurs which are longer in the ♀ than in the ♂; these spurs are not so stout as in *Thyella.* Genitalia (Figs. 2, 5, 6) allied to those of *Thyella*, but the suranal plate is narrower, compressed, subcultriform, while that of *Thyella* is broad and flat; the single pair of claspers are wide, but seen from above longer and slenderer than in *Thyella.* The penis is a cylindrical subacute process.

FIG. 3. FIG. 4. FIG. 5. FIG. 6.



Acanthocampa belina. 3, venation of hind wing; 4, a palpus denuded; 5, genitalia, sternal view; *s*, suranal plate; *cl*, clasper; *p*, penis; 6, genitalia, side view; *s*, suranal plate; *cl*, clasper; *p*, penis.

In its imaginal characters this genus agrees with *Thyella* in the shape of the front of the head, the palpi and especially the plumose antennæ with their long delicate densely ciliated branches, as well as in the shape and nature of the ocelli of each pair of wings; also in the ♂ genitalia. It differs decidedly from *Nudaurelia*, with which it has been associated, both in the antennæ and venation. The ♀ antennæ being subsimple, the species need not be confounded with those of *Antherina* and *Melanocera*, in which the ♀ antennæ are stated by Sonthonnax to be nearly as widely pectinated as in the male. Its divergence from *Thyella* is brought out in the preceding description.

Larva.—Generic characters. While the imago approaches *Thyella* in its most important characters, the larva is generically related to *Nudaurelia* (*N. dione* especially). It differs in the considerably shorter spines, which, however, are not curved as they are in that species. The dorsal spines of the thoracic and abdominal segments are all of the same length and size; the median dorsal spine of the eighth abdominal segment is more deeply divided than in *N. dione.* It differs also from *N. dione* in the presence of the numerous flattened fungoïd warts, there being none present in that genus, so far as yet known.

The genus is represented by *A. belina* (Westwood) a not uncommon species in Natal (of which, according to Rothschild, *Antheræa* *huebneri* Kirby is a synonym); and by *A. zambesina* (Walker) from Zanzibar. What is probably a third species is *Nudaurelia felderi* of Rothschild, from Bogos, Abyssinia. The wings of this species, he states, are "very similar to red varieties of *N. belina* (Westw.), but without the ocellus on the fore wings, there being only a small square vitreous spot. Another difference is the very broad white border to the ocelli of the hind wings." (Novitates Zoölogicæ, ii, p. 42, 1895.)

Larva of A. belina.—Last stage. Head about one half as wide as the body, slightly more than half as wide as the prothoracic segment; deep black, unarmed; surface with groups of from 1 to 8 microscopic granulations, arranged in irregular rows. Surface of the prothoracic plate rugose, unarmed, but bearing a number of long white hairs. In front of the prothoracic spiracle is a very low flattened tubercle not easy to detect, bearing about eight setiferous warts; lower down above the base of the leg is a low rounded tubercle about the size and shape of the one above, and bearing from 5 to 6 minute setiferous warts.

The body behind the prothoracic segment, including the 9th abdominal segment, is *armed with stout black spines, all of the same size,* which are inclined backwards, but *not curved,* being nearly straight and sharp, and from around the base arise about five long white radiating hairs, some nearly as large as the spine itself. The spines are rather short and small, but yet conspicuous (they are apparently longer than in *Nudaurelia dione* and *Thyella tyrrhea*).

The spines of the infraspiracular row are acute, black, and only about one half as large as those of the supraspiracular row. A series of still smaller ones along the base of the abdominal legs, becoming larger and more prominent on the legless abdominal segments 1, 2, 7 and 8.

The median horn on the 8th abdominal segment is *no longer than the other dorsal spines;* it is *very deeply cleft* (the largest), in one example much more so than in *N. dione;* in the smaller specimen (60 mm. in length) it is no more forked than in *N. dione*).

Suranal plate large, rounded on the hinder edge; the surface black, moderately convex and granulated, the microscopic granulations around the edge larger, with scattered very fine setæ. Anal legs large, black, subtriangular, with scattered warts.

Body above and beneath almost entirely covered with dense fungoid pearl-colored oval or polygonal warts, throwing off pearly reflections, and centered with a minute pit. These fungoid warts are more numerous and more crowded than in any other of the genera possessing them. Spiracles black. A reddish flesh-colored discoloration on each side of each thoracic segment, below where the spiracles should be if present, and below the prothoracic spiracle. Thoracic, middle abdominal and anal legs black. Length, 80 mm.

A Smaller One of Last Stage.—Length 60 mm. In the smallest of the three larvæ the median "horn" or spine is no more deeply cleft than in *N. dione.* That it is in the last stage is shown by the head being of the same size as in the others.

The fungoid warts are much less numerous. It also has more hairs arising from the spines, and they are inserted higher up from the base of the spine; also the spinules are reddish, but in the two other larvæ black.

For the opportunity of examining these and other larvæ, which are preserved in formaline and glycerine, so as to well retain the shape and colors, I am indebted to the generosity of Lieut. Col. J. M. Fawcett, of Carlisle, England, who has added so much to our knowledge of the Sphingicampid and Saturnian larvæ of southern Africa.

Aurivillius, gen. nov.

Saturnia WESTWOOD, Proc. Zool. Soc. London, March 27, 1849, p. 41.

Antheræa WALKER, Cat. Lep. Het. Brit. Mus., V; MAASSEN u. WEYMER, Beiträge zur Schmett., IV, fig. 59, 1881; KIRBY, Syn. Cat. Lep. Het., I, p. 756, 1892.

Nudaurelia ROTHSCHILD, Novitates Zoologicæ, II, p. 43, 1895; SONTHONNAX, Annales des Laboratoire d'Études de la Soie, X, p. 7, 1901.

This genus is dedicated to Professor Dr. Chr. Aurivillius, of Stockholm, who has added so much to our knowledge of the Lepidoptera of the Ethiopian realm. The type is *Nudaurelia arata* (Westwood); no other species is as yet known. It inhabits Natal.

Imago.—♂. Head smaller in front, not so broad as in *Nudaurelia cytherea*. Antennæ of male not so broadly pectinated; the tip with 7–8 joints, filiform, a little slenderer and the vestigial pectinations shorter than in *Nudaurelia*; the joints are rather long, slender and contracted at their base, especially those beyond the middle, where they are nearly three times as long as broad. Palpi stout, well developed, densely scaled, 3-jointed; when denuded they seem to be rather slender, the second joint nearly twice as long as the first, the third button-like, not quite so long as the second is thick.

Thorax moderately stout; vestiture moderately long; abdomen not very stout.

Fore wings somewhat more arched on the costal edge, and the apex more pointed than in *Nudaurelia cytherea*. Hind wings with the apex rounded; the outer edge moderately convex. Abdomen not extending to the outer third of the inner edge.

Venation: (Fig. 7) that of the fore wings differs entirely from the arrangement of the veins in *Nudaurelia cytherea;* in the place of origin of the first subcostal vein (II 1), which is situated at a point in front (towards the costa) of the end of the distal cell (in *Nudaurelia* it arises a little beyond the middle of the cell), it arises, moreover, a little more than half way between the origin of the common stalk of II 1, II 2, II 3, and II 4, and the stalk of veins II 1 and II 3. The two discal veins (discocellulars) form a rather short straight line; vein III 3 is partly detached, slightly more than in *Nudaurelia*. The venation of the hind wings is much as in *Nudaurelia*, with slight differences. Fig. 9.

Legs rather long, fore tibiæ rather long, the tarsi normal, well developed; tibial epiphysis of ♂ a little more than half as long as the tibia; oval-lanceolate, tip rather sharp; inner and outer surfaces clothed with a dense, very short pile; but along the outer edge a few large long scales. No spurs on fore tibiæ, but a short one on middle and hind tibiæ.

The male genitalia (Figs. 10, 11, 12, 13 and 14), present notable differences from those of *Nudaurelia;* the suranal plate is broad at base, but ends in a long

FIG. 7.

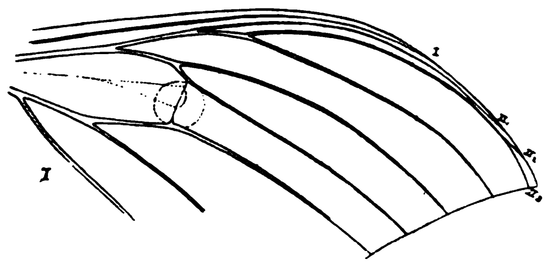


FIG. 8.

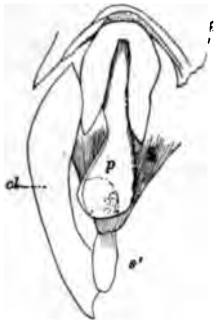


FIG. 9.

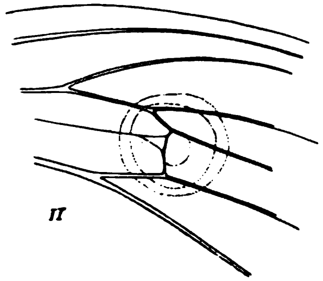


FIG. 10.

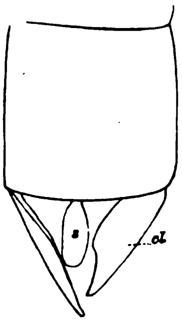


FIG. 11.

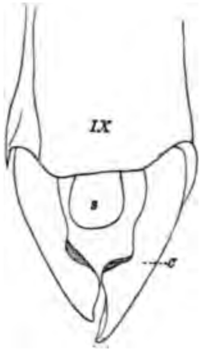


FIG. 12.

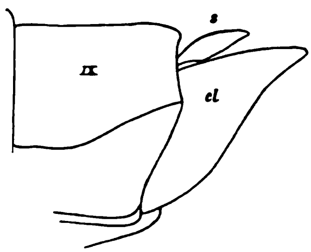


FIG. 13.

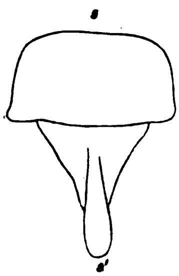
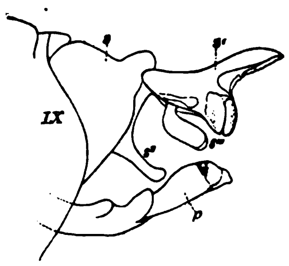


FIG. 14.



Aurivillius aratus. 7, venation of fore wing; 8, genitalia, ventral view with 9th abdominal segment removed; *cl*, clasper; *s*, suranal plate; *s'*, specialized extremity; *p*, penis; 9, venation of hind wing; 10, genitalia, dorsal view; *cl*, clasper; *s*, suranal plate; 11, genitalia, ventral view; *s*, suranal plate; *c*, clasper; 12, genitalia, side view; *s*, suranal plate; *cl*, clasper; 13, genitalia, dorsal view, with the last tergite removed; *s'*, specialized extremity; 14, genitalia, side view of suranal plate; *s*, suranal plate; *s'*, specialized extremity; s^{II}, process from base; s^{III}, a second process from beyond the base of suranal plate; *p*, penis.

(seen tergally) spatulate process, while that of *Nudaurelia* is scarcely longer than broad, and has no such prolongation, only a little knob; the claspers are longer, while the penis is very large and wide, ending in a wide lobe (seen tergally) and extends nearly to the end of the claspers.

The markings are in general similar to those of *Nudaurelia cytherea*, but the discal spot of the fore wings is much smaller, and less complete, the clear space minute; on the hind wings the discal spot forms a large red ocellus, the center piled with black scales.

Should the generic name here given have been preoccupied, it may be changed to *Euaurivillius*.

A REVISION OF THE NORTH AMERICAN SPECIES OF THE GENUS CHOREUTIS.

BY W. D. KEARFOTT.

These exquisite little creatures with their wealth of silver and metallic scales have always been of more than ordinary interest to me, and when I had the good fortune to breed a long series last summer, the subsequent efforts to identify them aroused an additional interest in the literature on the subject, of which this paper is the result.

I took a number of my bred specimens to the National Museum and compared them with all of the North American and European species there but could find none that were the same as mine. I then forwarded a pair to Lord Walsingham and another pair to Mr. E. J. Meyrick. Their replies, which I quote below, indicated that my species might be new and also raised the question whether the true *bjerkandrella* Thunb., and its var. *pretiosana* Dup., which have so long been on our lists, really do occur in the United States.

The investigation of the latter question was considerably more than I had bargained for, and for a novice seemed like presumption so soon after the revision of this group by Dr. Dyar and Professor Fernald, in the Canadian Entomologist.

I was fortunately, however, in possession of a goodly number of specimens from widely separated parts of North America, and as a primary requisite I obtained from Drs. Staudinger and Bang-Hass long series of the European *bjerkandrella* and *pretiosana*, as well as all other available European species of this genus. I was rather alarmed to find that, while closely allied, none of the European forms compared exactly with any I had from this country. I then borrowed from Dr. Dietz all of his specimens and again visited the National Museum and examined carefully all the specimens there (both North American and European). In the meantime Lord Walsingham kindly sent me a pair of *silphiella*, which he collected thirty years ago in California and Mr. Meyrick a specimen from New Zealand. Miss Murtfeldt also loaned me one of her Missouri bred specimens. Altogether I have had the opportunity for critical comparison of between 250 and 300 specimens.

Almost from the beginning I was convinced that we had a larger number of valid species than was indicated by the late synopses and this conviction was strengthened by the examination of each fresh lot of material, and what was most convincing was that the specimens could readily and easily be separated out into the specific groups I had arranged for them and moreover the species did not intergrade and I have seen no specimens that could doubtfully be referred to two or more species.

The only stumbling block was the separation of *pretiosana* from the nearest allied American form, as it certainly was but little less than sacrilege to attempt to root up and cast away so venerable a trespasser from our lists; in point of fact I have not a particle of doubt that in the, possibly not very remote, past *pretiosana* was common to North America, Eurasia, Australasia and possibly South America (I have an unidentified species allied to it from Brazil) but time and environment produce changes and I believe when a change becomes a fixture and invariable new species are evolved. In fact our science is based on evolution; we generally agree with Darwin that man's ancestor was monkey and while we can also agree that both have many characteristics in common it would be difficult to find one with the temerity to claim they were the same species or even that one is a variety of the other; and so, I have taken the stand that our American forms have all so far departed from the stem forms that we have separate and distinct species.

I have recognized twelve species and one variety and it is a nice question for the splitters and lumpers to decide whether there are ten varieties of *pretiosana* or whether they are all *pretiosana* or whether they are all good species. My conclusions point to the last, for the simple reason there is no trouble to separate out the species. Fortunately, in only one instance, was there a single specimen to represent a species, that, however, *extrincicella*, is so distinct from all others that it could not be an intergrade; of one other there were two specimens, of the balance from three to thirty odd. The largest number were of my bred specimens, *carduiella*, and of all of this number thirty-eight specimens, the marks, colors, shape, and size are constant in each, excepting, of course, the ♂ is slightly smaller than the ♀.

Unfortunately we have but little knowledge of the larval habits and life-histories of our American species. When these are all worked out we shall have better evidence to go by than classification based principally on coloration. Miss Murtfeldt has recorded the finding of the larvæ in communities on *Gnaphalium polycephalum* webbing the leaves and when nearly mature spinning quantities of somewhat viscid silk. In the National Museum are quite a number of specimens bred by Chittenden in the vicinity of Chicago on the same plant and with the same habit. Miss Murtfeldt's bred specimen is identical with the Chicago specimens, as are also flown specimens taken by Dr. Dietz at Hazleton, Pa., and all are very distinct from any other North American species. This species I have named *gnaphaliella*.

The larvæ of *silphiella* were found by Mr. Coquillett in Illinois on *Silphium integrifolium* in nests formed by fastening the terminal leaves together by a few threads.

I found the larvæ of *carduiella* feeding on the pith inside the main stalks of *Carduus spinosissimus* at Anglesia, N. J.

It will be observed that the habits of the only three larvæ known are quite different, the first spinning considerable silk and webbing the leaves, the second fastening leaves together with silken threads and the third, borers in the stalk. These differences in larval habits, not to mention the different food plants, would seem to indicate different species, especially as in the case of the first named, bred by two people, in different localities, but with exactly the same habits and producing exactly the same moths. The earlier descriptions of the larvæ are brief but they also seem to indicate differences.

As our early entomological literature is so widely scattered and frequently almost unavailable to the majority of working entomologists from having been published in foreign magazines or early American journals that have long been out of print, I have taken the liberty of repeating the original descriptions and the few references to the American species of the genus, so as to bring together in one paper all of the information on the subject that I have been able to locate, hoping it will be of assistance to others who may become interested in this group.

After each description I have also stated the chief claims for specific difference, usually in a comparative way to quickly assist in the identification. I have found one reference to American species of this genus by Zeller in Verh. Zool. Bot. Gesell. Wien, XXV, 320, 1875, of which the following is a literal translation:

> "*Choreutis pretiosana* DUPONCHEL, Suppl. IV, 182, pl. 65, f. 9.
>
> "*Choreutis vibrana* var. *australis* ZELLER, Isis, 1847, p. 643.
>
> "This species, which is found in the vicinity of the Mediterranean Sea, is separated from *bjerkandrella* Thunb. (*vibrana* Hubn.), only by its smaller size and lighter color, the markings are identical but the fore wings of *bjerkandrella* have not always a less convex hind margin. Besides *pretiosana* differs somewhat in size and the ♀ is somewhat smaller than the ♂.
>
> "The seven North American examples before me are still smaller than the ♀ of the European *pretiosana*. In the four from Texas, the two curved bands composed of raised scales (the first rather straight before the middle, the second bent and enlarged by two-thirds above the middle) are light gray, in the three from Ohio, which Schläger determined as *australis*, are pure white, so that the scales, under an ordinary lens, on the outer band are only indistinctly visible. (If these white bands are constant, these specimens may be separated as var. *ohioensis*.) I have taken in Syracuse (Asia-Minor?) a similar ♀ less distinctly white, but agreeing otherwise.
>
> "That the specific identity between the American and European examples is certain, and as an importation is not to be thought of *pretiosana* can be added to the species originally common to both continents."

I feel quite sure had Zeller the opportunity for studying large series of specimens from all parts of North America, he would have modified the views as expressed above, in fact Lord Walsingham, who has, I believe, the identical Texas and Ohio examples referred to by Zeller has compared them with specimens of *carduiella* and pronounces them distinct and even expresses a doubt that the European forms occur in this country at all, as will be noted in copy of his letter under the caption of *carduiella*.

Lord Walsingham, in Trans. Am. Ent. Soc., 1882, Vol. X, p. 167, refers to *bjerkandrella* and says:

> "This species has not, so far as I am aware, been recorded from North America. I have received it from Miss Murtfeldt, from whom the specimens in Professor Fernald's collection were also obtained. It occurs also in California, together with a form identical with, or very closely allied to, *Choreutis silphiella* Grote (Papilio, Vol. I, p. 40), which must probably be regarded as distinct."

SYNOPSIS OF SPECIES.

Fore wings pointed at apex.
With metallic scales on hind wings.
A few green metallic scales on fore wings.................................**inflatella.**
Metallic scales lilaceous only.......................................var. **virginiella.**
Without metallic scales on hind wings...**dyarella.**
Fore wings rounded at apex.
Fore wings ochreous at base.
Hind wings heavily white-banded.......................................**silphiella.**
Hind wings with short white dash..................................**gnaphaliella.**
Hind wings with no white dash...**carduiella.**
Fore wings brown at base, or slightly ochreous.
Fore wings with two prominent white bands..........................**onustana.**
Fore wings with the bands not white.
Basal brown space without or with but a faint lilaceous band.
Outer edge of cloud defined by a curved line.........**sororculella.**
Outer edge of cloud indefinite; wings elongate.......**coloradella.**
Basal space crossed by a whitish band.
This band curved.
Outer half of brown basal area not clouded with whitish scales...**occidentella.**
Outer half of brown basal area clouded with whitish scales..**busckiella.**
This band straight...**extrincicella.**
Fore wings white at base..**leucobasis.**

Choreutis inflatella *Clem.*

1863. *Brenthia inflatella* CLEMENS, Proc. Ent. Soc. Phil., Vol. II, p. 5.
1872. *Brenthia inflatella* STAINTON, Tineina No. Am., p. 209.
1900. *Choreutis inflatella* DYAR, Can. Ent., Vol. XXXII, p. 85.
1900. *Choreutis inflatella* FERNALD, Can. Ent., XXXII, p. 242.

Original description:

"Fore wings dull orange; in the middle of the wing dark fuscous, dusted with white. At the base of the wings are three or four small spots of a beautiful metallic green, and two others of the same hue, on the disk, between which, on the costa, is a small white spot. At the apical third of the wing is a curved metallic green band, extending from the costa to the inner angle, beginning on the costa in a small white spot. A little beyond the metallic line, towards the base of the wing, on the inner margin, is a small spot of the same metallic hue. Near the hinder margin is a subterminal dark fuscous line, which from the costa to the middle of the wing is overlaid with metallic green scales, and on the costa between the two transverse lines, is a white spot. Cilia fuscous, white in the middle of the wing. Hind wings dull fuscous, with two iridescent spots near the inner angle. Abdomen with two iridescent spots near the tip.

"Antennæ fuscous, annulated with white. Head and labial palpi gray varied with fuscous. Feet dark fuscous annulated with white. I have before me a single specimen taken on the wing in July."

Var. **virginiella** *Clem.*

1864. *Brenthia virginiella* CLEMENS, Proc. Ent. Soc. Phil., Vol. III, p. 505.
1872. *Brenthia virginiella* STAINTON, Tineina No. Am., p. 257.
1900. *Choreutis virginiella* DYAR, Can. Ent., Vol. XXXII, 85.
1900. *Choreutis virginiella* FERNALD, Can. Ent., XXXII, 243.

Original description:

"Fore wings dark brown, tinged with ochreous between the markings towards the tip, with an oblique, somewhat violet-hued silvery line, from the costa at the apical third, directed towards the anal angle; a line of the same hue from the tip of the wing, parallel to the hinder margin, and a white costal streak equidistant from the two silvery lines. On the inner margin, a little interior to the anal angle, is a silvery, somewhat violet hued spot. Cilia whitish beneath the tip of the wing, with a dark intercilial line. Hind wings dark brownish, with a silvery spot near the hinder margin above the anal angle. A single specimen. Virginia. Coll. Ent. Soc. Phila."

It is unfortunate that Dr. Clemens could not have reversed the order of publication of the above descriptions, so that the form with lilaceous scales only (*virginiella*) could be the species, and that with a few scattered greenish metallic scales (*inflatella*) the variety, as the former is the most common form. I have before me seven specimens of *virginiella*, five taken in the vicinity of Montclair, N. J., and two from collection of Dr. Dietz, labelled Toronto, Can., and have examined at the National Museum one specimen from Boston, Mass. (coll. Beutenmüller). There is also in the National Museum one specimen of *inflatella* (locality unknown).

The only difference that I can discover and in fact the only difference in Dr. Clemens' descriptions, although they are differently worded, of *virginiella* and *inflatella* is that the latter has a few greenish metallic scales on the inner and costal half of fore wings, while on *virginiella* all the scales are lilaceous. The outer marginal band of metallic scales on *inflatella* as well as other scales on outer half of fore wing are of this same color. So the only difference is that while in *virginiella* all the metallic scales are lilaceous, in *inflatella* some are lilaceous and some have a greenish reflection. I do not consider this a specific difference, but it may be known by its varietal name at least until the life history is known. It is probably the most distinct and least variable of any of the species of this genus, its nearest prototypes being *C. myllerana* F. of Europe and the larger Pacific Coast form *dyarella*.

The chief distinguishing characters are:

1. Shape of primaries unlike any *Choreutis*, except *dyarella;* apex terminates in a sharp point and outer margin nearly straight; in these

respects it more nearly resembles the genus *Simæthis*, where it may finally land.

2. A triangular ochreous area extending from tip along one-third of costa, thence to hind angle; this is divided by a paler ochreous wedge-shaped streak, widest at costa and pointed at hind angle.

3. On the costa, enclosed by the pale ochreous streak is a white spot, or triangular dash, base line along costa, lower apex pointing towards hind angle. There are two additional minute white costal spots, at equal distance apart, between this larger spot and base.

4. In fresh specimens the inner half of primaries are very thickly powdered with cream color scales.

Choreutis dyarella, sp. nov.

Dark brown, mixed with whitish scales. Fore wings shaded with bronzy red, most distinct on apical half; a few metallic scales towards base. A straight white shade from costa to inner margin at basal third, forming a distinct spot on costal edge. A similar narrow line at outer third forming a dot on the costa, two at end of cell and one on internal margin. A strongly curved line of metallic scale joins the costal and marginal dots, is twice broken and touches outwardly the third transverse white band, which reaches from costa before apex to anal angle and is nearly continuous, and is broken only at upper third where the metallic scale band touches it. The submarginal streak of metallic scales not reaching the apex. Fringe white, black at apex and anal angle with a brown spot in the middle.

Hind wings blackish, the usual submarginal dash yellowish-white, distinct. Fringe black with basal yellowish-white line; outer half white except at apex and anal angle.

Wings below smoky brown. Two obscure white dots on costa and a few scales outwardly on fore wings. Hind wings with outer irregular white curved line with a lunate white discal streak. Tarsi strongly banded with white. Femori blackish, with a median whitish band. Expanse, 12 mm.

Described from three specimens from Dunsmuir, Cal. (Wickham).

National Museum type No. 6263, one co-type in my collection.

I take pleasure in naming this species after Dr. Dyar.

This is a slightly larger species than *inflatella*, but it belongs to the same group, with acutely pointed fore wings.

It can be distinguished from *inflatella* by: (1) Larger size, (2) no metallic scales on hind wings, and (3) white submarginal band on under side of hind wings, in *inflatella* this band is reduced to a fine almost obsolete line.

Choreutis onustana *Walk.*

1864. *Simæthis onustana* WALKER, Cat. Lep. Het., Pt. XXX, 996.
1875. *Choreutis ohioensis* ZELLER, Verh. Zool. Bot. Ges. Wien, Vol. XXV, 320.
1900. *Choreutis onustana* DYAR, Can. Ent., Vol. XXXII, 85.
1900. *Choreutis onustana* FERNALD, Can. Ent., Vol. XXXII, 242.

Original description:

"Male. Ferruginous. Palpi acute, not longer than the breadth of the head, with a long dense fringe beneath; third joint lanceolate, much shorter than the second. Antennæ setose. Fore wings rounded at the tips, with two irregular, whitish slightly curved bands, and with several glittering chalybeous black-bordered dots; first band before the middle, more oblique than the second, which is beyond the middle; a chalybeous streak along the basal part of the costa; fringe bordered by two cinereous lines. Length of body 2 lines; of the wings 6 lines."

"Nova Scotia. From Lieut. Redman's collection."

The general appearance, shape and size of this species is not unlike European *pretiosana;* it differs from it in having two wide irregular pure white bands extending from costa to hind margin on the fore wing. Zeller received three specimens of this species from Ohio and suggested the name of *ohioensis*, if it should prove to be different from *bjerkandrella*, but Walker's description was made in 1864 and Zeller's name must go in the synonymy.

Walker gives locality Nova Scotia; Professor Fernald adds Amherst, Mass.; Dr. Dietz has specimens labelled Central New York, June 1, 1887. In the National Museum are specimens from New Hampshire and Ontario (Hanham), so it seems to be a northeastern species with Ohio as the south and western limit. It can be distinguished readily by the two broad, irregular, white bands, extending from costa to hind margin. The inner band is at inner third and outer band beyond outer third.

Choreutis gnaphaliella, sp. nov.

Light brown or fuscous. A broad inner band and a narrow band near margin, thickly sprinkled with whitish scales. Three large black spots.

Antennæ dark brown, ringed with white. Head, palpi fuscous, latter white at base; outer ends of scales on head paler. Thorax yellow, ochreous, a median line of whitish scales, patagia edged with ochreous.

Fore wings: Basal area ochreous, divided on median line by line of metallic scales, also a fine line of same on costa and a few metallic scales close to hind margin on outer edge of ochreous patch. A broad, oblique, slightly curved band of light brown heavily dusted with whitish scales, from costa to hind margin, outer edge irregular; a few scattered metallic scales on this band near costa and near hind margin. A large oval, black velvety spot in center of outer half, a smaller black spot on hind margin below and inwardly to large spot, a rectangular black spot on outer margin beyond large spot; all of these spots separated from each other by ground color; a few black scales follow apical line. Between central black spot and costa is a rectangular area of brown and ochreous scales, becoming almost black at outer edge; just beyond this, before apex, is a small patch of almost white. Scales forming a white costal spot. In every place where there are black spots or scales, they are overlaid with metallic scales. Outer marginal band brown, sprinkled with white scales; this band extends out on the fringe; the latter is fuscous.

Hind wings: Light fuscous, veins darker. A whitish subterminal dash. Fringe fuscous, shadowed by two pale marginal lines, outer edge paler.

Under side fore wing: Pale fuscous; white marginal line from costa to hind angle, paralleled by an inner whitish line. A white spot on costa at inner third, another on hind margin at inner third. Under side hind wing: Pale fuscous, a paler marginal line becoming white and broader at apex, nearly paralleled by a broader white band, inside of this is a white dash. Abdomen brown, a band of whitish scales at posterior edge of each segment. Legs so thickly covered with white scales that ground color is almost hidden; except tarsi, pale golden beneath and an alternate brown and white ring on each joint above. Expanse, 7.5 to 8.5 mm.

Described from eight specimens. St. Louis, Mo. (Miss Murtfeldt) Hazleton, Pa. (Dr. Dietz), Chicago, Ills. (Chittenden.)

Type, U. S. Nat. Mus., No. 6264; co-type, Collections, Murtfeldt, Dietz, Kearfott.

The following description of larva and habits by Miss Murtfeldt is quoted from Professor Fernald's paper, Can. Ent., XXXII, p. 241:

"The larva is found late in June (in Missouri), and again in October, mining and webbing the leaves of *Gnaphalium polycephalum*. When small it works chiefly between the cuticles of the leaves, but later feeds externally, spinning quantities of somewhat viscid web, among which the black powdery frass is profusely scattered.

"The mature larva is 6 mm. in length by 1.5 in diameter across middle segments, from which it tapers very slightly in both directions; form cylindrical, submoniliform. Color translucent, whitish green, immaculate. Head oblique, same color as body, but horny and polished. Collar inconspicuous. Legs concolorous with general surface. Before the first transformation it becomes gregarious, the larvæ spinning their dense white sticky cocoons, something to the number of a dozen in close proximity in the general web.

"Pupa pale golden brown, 4 mm. in length, and rather stout, with no especially marked characters. Imagines in seven or eight days after pupation.

"In central Missouri the species is rather rare, and, within the limits of my observation, has only occurred three times within the last dozen years, although careful watch for it has been maintained upon its food plant. So far it has not been found upon any *Gnaphalium* or *Antennaria*, except *G. polycepha um*. I have never taken this species at light."

Choreutis silphiella *Grote.*

1881. *Choreutis silphiella* GROTE, Papilio, Vol. I, p. 40.
1882. *Choreutis silphiella* WALSINGHAM, Trans. Am. Ent. Soc., X, 167.
1886. *Chalcœla gemmalis* HULST, Trans. Am. Ent. Soc., XIII, 148.
1890. *Choreutis silphiella* DYAR, Can. Ent., Vol. XXXII, p. 85.
1890. *Choreutis silphiella* FERNALD, Can. Ent., Vol. XXXII, p. 241.

Original description:

"Thorax orange, with a metallic stripe on the tegulæ. Head olivaceous. Pectus and basal joint of palpi whitish. Fore wings with the base orange, to a dusky, inwardly oblique, transverse shade line. A longitudinal metallic stripe before the shade line below costa and some metallic scales below median vein. Middle of the wing mottled, grayish, enclosing two metallic discal spots edged with black, superposed; below them two faint blackish lines to internal margin. Apical portion of the wing taken up with a wide circle of dusky and orange scales enclosing a series of metallic points edged with black. The space enclosed by the circle, near the margin, is gray and mottled like the middle of the wing. The metallic spots have a violet or green reflection. The circle is twice cut by oblique orange stripes, over the subcostal nervules and over the median nervules, in opposing positions. Edge of the wing dusky, fringes dark. Costal edge with two white dots beneath, wide apart. Hind wing blackish; beneath crossed by a white sub-terminal band, and another before the middle of the wing. Length of fore wing 5 to 6 mm.

Hab. Illinois.

The larva of this species is described by Mr. Coquillett as follows:

"Body thickest at the middle, tapering towards each end, pale green; a dark colored dorsal line; piliferous spots and cervical shield green; head small, nearly horizontal, pale green, with a black dot on each side near the jaws, and usually with a black dash on each side near the junction of the head with the first segment; venter pale green, unmarked; 16 legs; length, 13 mm. Lives in communities on *Silphium intrgrifolium* in nests formed by fastening the terminal leaves together with silken threads. Found June 19; imagoes July 2."

Mr. Grote prefaces the above with the following: "Mr. Coquillett has communicated to me specimens of a *Choreutis* which he has reared, together with a description of the larva. The species appears to be new and is considered by Professor Fernald to be distinct from *pretiosana*." Mr. Grote concludes his description with the statement: "a distinct but allied species of *Choreutis* has been collected by Mr. Hy. Edwards in California (Sierra Nevada)."

The following is Dr. Hulst's description of *Chalcœla gemmalis*, which is manifestly the same as Mr. Grote's species. I have not been able to find Dr. Hulst's types.*

"Expands 15 mm. Head brown, palpi brown, fringe in front; thorax and basal portion of fore wings rich golden brown; fore wings beyond light ochre, with fuscous shadings; margin yellowish brown, fringe black; near middle of wing, also just within indicated extramedian line, and also on subterminal space at middle, is a velvety black spot, the three being in a row; a fine black line runs from costa to middle spot; there is also midway along costa a faint subcostal black spot; each of all these spots surrounds a few bright golden metallic scales; there is also a line of metallic gold basally along costa; hind wings nearly even, fuscous; beneath, fuscous with a golden tinge, a white spot on costa at beginning of outer line, which is indistinct; an outer cinereous line on hind wings; all margins with whitish lines; fringes fuscous.

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* Hulst's type of *C. gemmalis* is in the Hy. Edwards collection, American Museum of Natural History, and it is identical with a specimen labeled *C. silphiella* Gr.—W. Beutenmüller.

"Two ♂ ♂, Sierra Nevada Mountains, Cal. The second specimen has the golden brown of thorax and fore wings replaced with fuscous."

In a general way this resembles the European *bjerkandrella* Thunb., but I have no hesitation in pronouncing it distinct, and moreover from the material I have had an opportunity to examine it is not especially variable. Compared with *bjerkandrella*, the primaries are quite different in outline, in *bjerkandrella* they are rather short and rounded, while in *silphiella* they are elongated and the outer margin instead of being an easy curve is nearly straight. The ochreous base extends farther along the costa than in *bjerkandrella* and its area is greater. The general color of *silphiella* is lighter. The white lines and dashes on the hind wings are much broader in *silphiella;* this is especially apparent on the under surface. The fringe on the hind wings is longer in *silphiella*.

This species has a wide range. Coquillett, who bred the specimens from which Grote described it, took the larvæ in Illinois, Lord Walsingham collected specimens which are labelled "Head of Noyo R., Mendocino Co., Cal., June 8 to 11, 1871." I have specimens from Yellowstone Park, Wyo. (Burrison), and Chicago (J. H. Reading).

In all of the specimens the marks and characters are constant with very slight variation, certainly not enough to warrant a connecting link between it and any other species recognized in this paper.

Its distinguishing characters are: (1) Large size, expanding 15 mm.; (2) ochreous patch at base of primaries, involving one-quarter of length of wing, head and thorax of same color; (3) outer three-quarters of primaries thickly sprinkled with cream color scales; (4) two large velvety black spots on outer half, ornamented with metallic scales, and (5) broad white dashes and lines on inferiors.

Choreutis carduiella, sp. nov.

Dark brown, thickly dusted with cinereous scales, without a lens the ground very dark, almost black, slate color.

Antennæ dark brown, ringed with whitish, tuft at tip of basal joint. Palpi brown, streaked with orange on second joint, basal joint almost white.

Head brown, dusted with white specks. Thorax orange-ochreous streaked with cinereous; outer edge of patagia and two streaks on mesothorax cinereous. A row of greenish metallic scales on inner edge of patagia.

Fore wings: Deep fold at base of median vein, above this at base is a tuft or streak of long raised orange ochreous scales, below it is a smaller patch of shorter scales, same color in ♀ but dark umber in ♂; between these orchreous streaks on median vein, also on costa next to base, is a fine line of metallic scales, also a few metallic scales below ochreous patch near inner angle. Next, outwardly, is a broad band of ground color from costa to hind margin, thickly sprinkled with cinereous scales, this band is divided on its lower half by a darker line free from lighter scales; on the outer edge of this patch is a line of metallic scales extending half way across wing from costa. Adjoining this outwardly on costa, is a broad patch of long raised orange-ochreous scales, lower edge covering end of cell. On the outer edge of this patch is a line of metallic scales separating it from a short dark oblique line.

Below orange patch is a large velvety-black spot, extending to outer margin, but not to hind margin, this black patch is cut near its outer truncate end by a line of orange-ochreous scales. Many metallic scales are sprinkled over the black. Just below orange patch, in center of wing on hind margin, is a small black spot, beyond this is a smaller black spot. The long raised scales forming the large orange patch above end of cell, become darker and almost black in the lower central part, where it adjoins the black patch just below, these dark raised scales are heavily sprinkled with metallic. The lower, outer edge of black patch, which closely follows line of hind angle is defined by a narrow row of metallic scales. The outer margin below apex is of ground color heavily overlaid with lighter scales, except at the apex, which is almost free from these scales. Along costa just before apex is a short line of darker ochreous, inside of this is a fine line of metallic scales, slightly curved downward at outer end, bordering this on the inner side is another irregular band of ground color free from lighter scales, inwardly is a broader band of ground color, heavily overlaid with whitish scales, extending from costa to center of outer margin where it is absorbed in the marginal band. Fringe fuscous.

Hind wings fuscous, no white dash, but a very few scattered whitish scales forming a thin line along margin at and before apex. Fringe lighter fuscous.

Under side fore wings; dark shining fuscous, a white oblique dash at outer third; this white dash is obsolete in some specimens; a line of white scales along margin and another line of white on fringe paralleling marginal line, a few whitish scales inside of hind angle.

Under side hind wings; same color as fore wing, a short apical curved white line, a long curved submarginal white line, interrupted at upper third and a white dash in center of wing; a small white dot on costa about middle of wing. The white lines and marks on under surface have a bluish reflection.

Abdomen: dark brown, almost black, broad band white scales at posterior end of each segment, anal tuft blackish. Legs blackish, thickly sprinkled with white scales; tarsus golden on under side, white ring on each joint on upper side. Expanse, ♂ 10 mm., ♀ 12 to 13 mm.

Described from thirty-eight specimens bred from *Carduus spinosissimus* Walt. Taken at Anglesea, N. J., June 21–23, 1901. Issued July 2–10.

Types: ♂ and ♀. U. S. Nat. Mus., No. 6265.

Co-types: Collections Walsingham, Meyrick, Dietz, Kearfott, Murtfeldt, and Am. Mus. Nat. Hist.

Larva. Last Stage: 12 mm. long, cylindrical, head and second segment slightly tapering, anal end rather blunt. Color pale yellow.

Head: Width .95 mm.; length 1.05 mm.; color pale chestnut, strongly bilobed, lobes full and rounded; clypeus narrow at base, evenly triangular, high but not reaching to second joint, suture between lobes deeply indented; occelli on black field; epistoma lighter chestnut or yellowish, labrum and maxillæ brown; antennæ short; spinneret large, with a long spine or thick hair. On back edge of each lobe, partly hidden by segment 2, is a triangular black spot and short black line following joint dorsad. Setæ on head long, ½ to ⅔ thickness of head.

Thoracic feet pale chestnut, basal joint of each whitish and defined by narrow chitinous oval band, this band not complete, but absent on outer or lateral edge. Shield on second segment same color as head, divided by paler dorsal line, moderate, front edge straight, hind edge rounded, bears six setæ each side in usual position, a large brown tubercle before and on a line with spiracle bears two setæ; another large tubercle bearing two setæ below spiracle. Segment three (mesothorax) tubercles, ia + ib, iia + iib, iii separate, iv + v; the first two and last in a vertical row, iii between and caudad to iia + iib and iv + v; vi on center of segment just above foot. The tubercles or tubercular plates are largest and darkest on prothoracic segment, slightly less on next and paler on metathorax, and all are darker than the abdominal plates.

Abdominal segments i dorsad and cephalad to ii, iii dorsad and close to spiracle, iv and v united caudad and cephalad to spiracle vi above base of proleg and just below it on base of proleg is another small tubercle bearing a single seta (vi–a?).

Anal shield not chitinous. Abdominal tubercular plates are moderately large, pale brownish-yellow. Setæ are pale, rather long, about half body diameter. Crochets on abdominal feet in closed circles, hooks brown. Tubercles on head look like tiny globules of clear glass resting on the flatter surface, the tubercles on the body tubercular plates are also tiny globules or points, from which the setæ arise. Spiracles slightly elliptical and ringed with brown.

Skin slightly granulated and covered with very minute hairs.

Cocoon: Boat or hammock-shaped, pointed at each end, 15 to 20 mm. long, 3 to 4 mm. wide, of soft fine pure white silk of the same appearance and texture as the egg-nests of some spiders.

Pupa: Bright chestnut, darker on dorsum, very smooth and rounded; on each abdominal segment dorsal surface is a finely fluted ridge, very minute hooks on anal segment; all abdominal segments free, no organs free but after dehiscence antennæ cases are free. 6 mm. long, 1.5 mm. thick.

Habits: Feeds on pith in main stalks of *Carduus spinosissimus*, from two or three to a dozen or more may be found in each stalk, they excavate a gallery nearly its whole length, common to all; gallery not lined with silk, at convenient intervals and usually just above a new joint or above where stalk branches forth are small holes, through which the frass is ejected outside of the stalk. In fact an easy way to ascertain if the stalks contain larvæ is to examine them for considerable masses of frass resting in the angle between the main stem and branches.

All the larvæ that I observed were within the stalks, but there is evidence that they come outside, as the under side of the leaves was covered with a slight web of silk. This may be the foundation for cocoons which are spun under the leaves and below the thistle head in any convénient partially protected angle. It is also possible that the larvæ eat the epidermis from the under side of the leaves, as they appear to have been eaten in spots, but not nearly sufficient for the sustinence of the larvæ and my opinion is that their principal food is the pith.

Mr. Meyrick makes the following comparison between *bjerkandrella* and *carduiella*:

"On comparison of your specimens of *Choreutis* with *C. bjerkandrella*, I am decidedly of the opinion that, though very closely allied, they are quite distinct specifically. It would be *possible* that the exhibition of connecting forms from other parts of America might modify this view, but I do not know of any such. The points of difference on which I should rely are as follows:

1. *C. bjerkandrella* has a silver spot on the middle of the costa of the fore wing, which is wholly absent in your species.

2. In *C. bjerkandrella* the two light fasciæ of fore wing form white spots on costa, in yours they do not.

3. In *C. bjerkandrella* the anterior edge of the second light fascia is entire, whilst in your species it is interrupted from the middle to near dorsum, there being a fulvous streak in its place, which is absent in *bjerkandrella*.

4. The fasciæ of lighter irroration are much broader and more extensive in your species.

5. The silver streak on the anterior margin of the second fascia towards costa is very much more oblique in your species.

6. In *C. bjerkandrella* there is a short white post-median bar in hind wings; in your species this is barely indicated by two dots or two white scales each, which are moreover differently placed and nearer the termen.

These points appear to me to be all quite constant, and fully sufficient.

I enclose a specimen of *C. bjerkandrella* from New Zealand as a type for your use; I am not aware that it differs in any obvious way from South European examples.

Does the true *C. bjerkandrella* occur in America, or do the published records of it refer to your species?

Lord Walsingham's comparison of *bjerkandrella* and *carduiella* is as follows:

"I am very much obliged to you for allowing me to keep the three specimens of *Choreutis* sent for examination. I am not acquainted with any description of either of them.

"At a time when I was not in possession of so large a series of North Amertcan representatives of this genus as I now have, I was unable to separate specimens from California or from Missouri from the European *bjerkandrella* Thunb., which has been joined to *pretiosana* Dup., by Staudinger. Zeller regarded these two European species as distinct at the time when he identified specimens from Texas and Ohio as *pretiosana*, and his specimens, now before me, are certainly nearer to this than to the typical *bjerkandrella*, but I now see differences which may possibly be of special value in all of the American species.

"Your two New York examples are nearer to *pretiosana* Dup. (= *australis* Z.) the South European form, but they differ in having no markings on the under side of the fore wings, and in the presence of a small metallic spot above the dorsum on the inner edge of the first pale sprinkled band near the base. This occurs also in Zeller's and Murtfeldt's specimens, but not in the European forms. I think your two New York examples are distinct from all with which I am acquainted. Notably, in the absence of a distinct pale streak on the upper side of the hind wings. As you have compared it with American types you are probably justified in separating it. I send you two specimens of *silphiella* Grote. It seems to me rather a stretch of imagination to lump this with *bjerkandrella*."

Choreutis busckiella, sp. nov.

Dark brown, heavily overlaid with whitish scales, with only a trace of ochreous.

Antennæ brown, ringed with white. Palpi brown, whitish at base. Head and thorax brown, dusted with white, no ochreous scales, a few silvery metallic scales along lower edge of patagia.

Basal area dark brown, a faint streak of ochreous below costa, in some specimens no trace of ochreous, costa at base black, overlaid with metallic scales; a wide dark brown band beginning at costa extends downward half and then at right angles to hind angle. On the lower end of this band is the usual velvety black patch; in this species it is large and almost rectangular, cut near its lower end by a double line of dark brown; between this dark band and basal area as well as the balance of fore wing is of ground color heavily overlaid with whitish.

Metallic scales occur: a line on costa near base, a short line below on median line and a few scales below this near hind margin; on first white band, a line of scales extending from costa nearly to hind margin just beyond first third, this line interrupted twice and curving slightly outward at lower end; three small spots in oblique line from costa on dark brown patch, below this is short horizontal line; a line of scales beginning at costa outer third and following margin around apex and outer margin to hind angle, interrupted once above and once below apex. Fringe brown.

Hind wings grayish-brown, a short curved line of whitish scales about center of outer margin and a few scattered whitish scales at apex. Fringe brown.

Under side fore wings immaculate, fuscous. Under side hind wings fuscous, narrow band whitish, parallel to outer margin, a shorter whitish line within this, and a short dash about center of wing.

Abdomen brown, under side whitish. Under side thorax white. Legs brown, sprinkled with white. Expanse, 12 to 13 mm.

Three specimens, Hastings, Florida. (A. J. Brown), March 15 and 16.

Type, U. S. Nat. Mus., No. 6307; co-type, Collections Dietz and Kearfott.

I am glad to honor this species with the name of my friend, Mr. August Busck, to whom I am under many obligations for assistance and advice, and who will, in a very brief time, be known as our foremost American authority on Tineidæ.

This species differs in the almost total absence of ochreous from the thorax and fore wings, and in the almost uniform color of the latter. The fore wing is divided almost equally into four bands, the basal and second intermediate brown or black and the first intermediate and marginal almost white. Its nearest ally is *carduiella*, and it may, when the life-history is known, prove to be an extreme form of this. It can be distinguished from *carduiella* by: (1) ochreous obsolete or nearly so; (2) much lighter and whiter in color, and (3) whitish curved line on hind wing.

Choreutis sororculella *Dyar.*

1890. *Choreutis sororculella* DYAR, Can. Ent., Vol. XXXII, p. 86.
1890. *Choreutis sororculella* FERNALD, Can. Ent., Vol. XXXII, p. 242.

Original description:

> "Generally similar to *bjerkandrella*, Thunb., but without any traces of the yellow dashes at the base of the fore wings. The pale gray space in the middle of the wing is sharply limited without and within by a paler line; in the center of this space is a large group of black and metallic scales; beyond the pale line are no black scales, but a regular, distinct, subterminal metallic line; a subcostal metallic streak in basal space. Hind wings with a white dash as in *onustana*."
>
> "Two examples. Placer Co., California. June (A. Kœbele); U. S. Nat. Mus., type No. 4426."

I consider this a good species. It can be distinguished easily from *silphiella*, *gnaphaliella*, etc., by the narrow whitish band next to outer margin, which curves easily and evenly, slightly inwards to the costa; whereas, in *silphiella*, etc., this band is sharply right-angled at about one-third from the costa besides broadening out into a spot.

The basal area of front wings is uniformly light fuscous, next outwardly is a large patch of whitish; this patch only touches costa at a point next to basal fuscous patch. Inside of white band along outer margin are three velvety black spots, arranged in the form of a slight crescent.

Distinguishing characteristics: (1) General color pale fuscous, no ochreous, (2) marginal white band slightly curved, not angled, (3) velvety black spots arranged in a crescent following line of outer margin. Center spot slightly larger than other two.

Choreutis extrincicella *Dyar.*

1890. *Choreutis extrincicella* DYAR, Can. Ent., Vol. XXXII, p. 86.
1890. *Choreutis extrincicella* FERNALD, Can. Ent., Vol. XXXII, p. 242.

Original description:

"Light brown, head and palpi whitish. Fore wing with basal half brown, crossed by a broad, straight, white line with a few silvery scales outwardly on costa. Terminal half of the wing nearly white, except narrowly along outer margin, streaked above with longitudinal, somewhat cuneate, lines of black scales, below containing a single elongate, rounded, black patch with two groups of silvery scales; similar scales on outer border of white patch; outer half of fringe white. Hind wings pale brown. Expanse 12 mm."

"One male. Wisconsin. U. S. Nat. Mus., type No. 4427."

The species is more unlike the general *bjerkandrella* type than any of the genus. It is a very beautiful species and Dr. Dyar fortunately, when making his description, had before him an almost faultless specimen. It can be recognized at once by the large amount of white on the fore wings.

The largest patch of white almost entirely covers the outer half, extending from costa to hind margin. Near the anal angle is a velvety black spot, ornamented with metallic scales, this spot encroaches on and appears to be laid on the white. The outer margin is light fuscous. The inner edge of the large white patch is bounded by a broad almost straight fuscous band, next towards the base is a narrower whitish band, the base of wing is fuscous. All of these bands and colors extend from costa to hind margin. Hind wings are immaculate and under side of all wings are free from whitish lines and dashes and very pale in color.

It can be identified by: (1) Very large white patch on outer half of fore wing; (2) a single rectangular velvety black spot on this white area, near hind angle is also a very small black spot > shaped. This is close to margin and just above the large black spot. (3) Hind wings immaculate. (4) Under side of all wings very pale and free from whitish marks.

Choreutis occidentella *Dyar.*

1890. *Choreutis occidentella* DYAR, Can. Ent., Vol. XXXII, p. 86.
1890. *Choreutis occidentella* FERNALD, Can. Ent., Vol. XXXII, p. 242.

Original description:

"Grayish brown; basal half of wing of this color, with a curved white line across its center. Terminal half of wing filled, except somewhat narrowly along outer margin, by a large whitish patch, irrorate with brown scales, containing above a small black patch and below a large quadrate one, cut by a whitish line transversely; silvery scales along costa basally, middle of wing, subterminally and in the black patch. Hind wings brown, immaculate. Below a faint, irregular, whitish, submarginal line on hind wings and two costal dots on fore wings. Expanse 14 mm."

"One male. California (Coll. Beutenmüller). U. S. Nat. Mus., type no. 4428."

I consider this a good species; it can readily be separated from *silphiella* by the absence of the ochreous patch at base of front wings, in place of which is a whitish curved band, convex outwardly, just beyond base and extending from costa to hind margin.

The pattern of coloration and metallic scales on the apical half of front wings is not unlike *leucobasis*, inasmuch as in each species there is a large wheel-like or circular mark; in *occidentella* the upper part is defined by two white dashes on the costa, enclosing an area more or less suffused with whitish scales, the lower part is defined by a pair of velvety black spots. Dr. Dyar described the species from one specimen labelled "California." In my collection is one specimen from Yellowstone Park, Wyo., taken by Mr. Burrison late in June or early July, 1900. My specimen differs from type only in that there is less white in the circular mark referred to.

This species can be distinguished by: (1) Head, thorax and basal half of fore wing brown, (2) curved white line from costa to hind margin, close to base and (3) hind wings brown, not marked with white lines or dashes.

Choreutis coloradella, sp. nov.

Head, thorax, fore wings dark brown, sprinkled with lilaceous scales; basal half of fore wings broadly of ground color; crossed in the middle by a faint curved lilaceous whitish band, sometimes obsolete. Outer half washed with lilaceous, except at margin, this area forming a large rounded patch reaching costa and inner margin, obscurely divided in the upper half by blackish veins; containing below an elliptical patch of black slightly raised scales, truncated outwardly, divided by an almost vertical line of whitish or faintly orange-tinted scales, marked with a few metallic scales.

A faint oblique metallic line from costa basal third to this patch below middle. A small curved subapical metallic line. In some specimens ground color becomes almost white in a dash bordering black patch above. Fringe blackish, interlineated with white. Hind wings blackish, fringe interlineated with white. Fore wings dark gray below, slightly washed with whitish towards apex, no definite lines. Hind wings washed with whitish except on veins. Expanse, 13 to 18 mm.

Described from six specimens. Durango, Colo. (Dietz), southwestern Colo. (Dietz), Colorado (Fernald), top Las Vegas range 11,000 feet, New Mexico (Cockerell), Sitka, Alaska (Kincaid, Harriman

Exp.). National Museum. Type No. 6266. Co-types in collections of Dietz and Kearfott.

This species is very distinct from any other of this genus. The wings are unusually elongate and it is the only species I have seen in which the basal ground color so prominently occupies the inner half of fore wings. The other half, excepting the outer margin and apex, is almost uniformly overlaid with lilaceous scales; thus the appearance of the fore wings is of two colors, almost evenly divided, the inner half brown and the outer half whitish. The upper surface of hind wings is blackish-brown, unmarked with whitish lines or dashes, in this latter respect alone it differs entirely from *silphiella*. But there is hardly a doubt the two species could be mistaken for each other, as *siphiella* is of various shades of light browns, yellows and ochreous, whereas *coloradella* is dark brown or blackish and sordid. It is very different in general appearance from *occidentella*, the latter is well marked with clearly defined and prominent white lines and bands which are entirely absent in *coloradella*. Professor Fernald, Can. Ent., XXXII, p. 242, 1900, under heading of *C. occidentella*, states he has "long had this species in his collection, under the name of *coloradella* and has so named it for others." I very much regret he did not publish his description, as I am well convinced the species will stand, and I take pleasure in giving it the name Professor Fernald had selected.

It can be distinguished by: (1) Large blackish brown basal area, (2) absence of ochreous at base or thorax, and (3) blackish-brown hind wings, unmarked.

Choreutis leucobasis *Fern.*

1900. *Choreutis leucobasis* FERNALD, Can. Ent., Vol. XXXII, p. 242.

Original description:

"Expanse of wings 10 to 12 mm. Head, thorax and base of fore wings pure white. Outer two-thirds of fore wings dark fuscous or reddish brown, with an oblique, white costal streak before the apex, and two others of the same color, but much smaller, on the costa between this and the white base of the wing. Outer part of the wing more or less overlaid with white scales, so dense beyond the cell as to fuse and form a distinct whitish patch.

"There are numerous clusters of metallic scales scattered over the outer part of the wing, some of which form a curved line around the apex on the border, and there are two large clusters of them resting on a black ground between the white patch and the fold. Fringes reddish brown.

"Hind wings and upper side of abdomen fuscous. Under side of all of the wings fuscous, with the white costal spots reproduced, and there are several whitish cross lines on the under side of the hind wings. Under side of the body white. Legs white, annulate with black."

"Described from four specimens, two from London, Ontario, and two from Massachusetts. This species was figured by the late Townend Glover in his unpublished work on N. A. Lepidoptera, Pl. 83, Fig. 21."

This is a good valid species and distinguished easily from all others, now known, of this genus. Professor Fernald's types are from London, Ont., and Mass. I have one specimen taken near Clarendon, Vermont; one specimen, National Museum. No locality label. Characteristics: (1) Head, palpi, thorax and base of primaries (about one-quarter) white; (2) large black patch near hind angle, primaries crossed vertically by paler line of white and pink scales and a ring or eye like spot of metallic scales with center black, metallic scales distinctly raised.

I would very much appreciate the privilege of examining additional specimens of this genus, and will take pleasure in naming and returning promptly all examples that may be sent for that purpose, and especially would be grateful for notes or information pertaining to the larvæ or early stages.

◆

THE LARVA OF EUTHISANOTIA TIMAIS *CRAM.*

By Harrison G. Dyar.

1852.—Guenée, Spec. Gen., VI, pl. 2, f. 5.
1857.—Chenu-Demarets, Encycl. Hist. Nat. Papill., II, 111.
1886.—Gundlach, Ent. Cubana, 304.
1894.—Slosson, Journ. N. Y. Ent. Soc., II, 107.
1901.—Swainson, Journ. N. Y. Ent. Soc., IX, 81.
1901.—Dyar, Proc. Ent. Soc. Wash., IV, 454 (egg).

Guenée's figure represents a white larva with a straight black band in the segmental incisures and two narrower ones on the central part of each segment. Head and feet blackish. Mrs. Slosson described the larva briefly as "velvety black, marked with creamy white, head and feet of orange red"; Mrs. Swainson as "black, covered with small pale yellow dots; face, legs and tail dull buff with black marks."

Larvæ before me from the Everglades, seven miles from Miami, Florida, through Dr. J. E. Benedict, April 6, 1901, do not agree with Guenée's figure, but rather with the descriptions of the two ladies. I have not seen the other references.

Larva.—Head rounded, scarcely bilobed, flattened before, erect, free; orange brown, a large, diffuse, black patch on the face of each lobe at the height of the apex of the clypeus, a patch over ocelli and last antennal joint black. Setæ rather coarse, black; width 3.5 mm. Body moderate, cylindrical, uniform, not tapering and not humped. Ground color velvety black; a broad yellowish-white band in the segmental incisures reaching to the line of the feet, joined below the line of the spiracles to a second short band which begins on the middle of the side and extends downward to a little below the line of the feet. A small, anteriorly situated dot dorsally on joints 3, 4, 9–13, sometimes present also on 8 or 7 and 8, but always smaller on these segments. The band in the incisure 2–3 is somewhat broken and the one in 12–13 is narrowed. There is a small dorsal bar representing a band between 13–14, just in front of the anal plate. On joints 5, 6, and 12 the pale bands run a little further ventrally and have a supplementary spot. All feet orange brown, thoracic ones with tips black, the abdominal claspers and tubercle vii black. Cervical shield undifferentiated, black, the anterior edge of joint 2 brown. Anal plate orange brown with a black posterior rim and tubercle each side middle line. Tubercles small, obscure; iv a little below the middle of the spiracle. Setæ rather distinct, black.

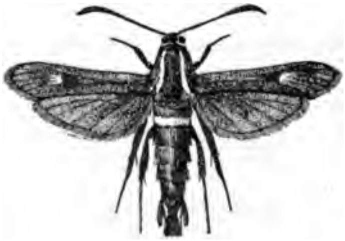
◆

DESCRIPTION OF A NEW SESIA.

By William Beutenmüller.

Sesia palmii, sp. nov.

Head and palpi dark brown; collar mixed with a little white. Antennæ brown black, with a bluish lustre. Thorax dark brown with a broad white stripe on each side. Abdomen dark brown with a bluish lustre, and broad white band at the hind edge of the second segment. Anal tuft dark brown with two white streaks. Underside of body wholly brown, also the legs. Anal tuft with two short white streaks, not reaching the end. Fore wings opaque, brown with a purplish lustre, and a small white spot composed of scales at the end of the cell. Hind wings opaque, wholly brown. Underside of wings same as above, but the fore wings are marked with whitish along the costal region. Expanse, 28–30 mm.



Habitat.—Phœnix, Arizona.

Described from two males. Types, Collection Am. Mus. Nat. Hist., and Charles Palm. The figure is enlarged one fourth.

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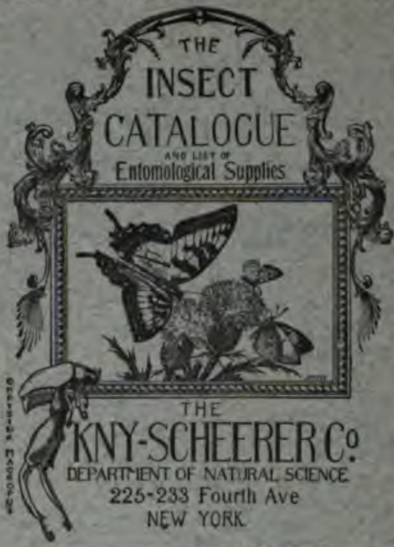

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TWO PHILIPPINE MOSQUITOES.

BY C. S. LUDLOW.

Among the new undertakings begun in the Philippines under the shelter of the Army, is the study of some of the insects connected with the transmission of diseases, especially of mosquitoes; and in the little while that this work has been under way interesting points have developed in connection with what may be called "insular variation."

This, so far as has been observed, usually occurs so as to throw the new variety between two established species, and, in many cases, is so marked as to raise a question as to identity of species, or even where the species may be granted, is enough to prove very trying in classifying these insects. For instance, what in other respects is *Anopheles rossii* Giles has "curiously mottled" legs, not described for the type, but resembling those of *A. costalis* Loew. What should be *A. annularis* van der Wulp, which Theobald places as a subspecies under *A. sinensis* Wied., evidently stands between that and his subspecies *pseudopictus Grassi*, for while it agrees to the former in most points, it agrees with *pseudopictus* in having three joints of the palpi banded white and the tip white, in having the third small light spot on the subcosta (besides the two on the costa), and in the thoracic lines, there being no spots or change of color between the scales of the cephalic and caudal end of the thorax as in *annularis;* while it differs from either in having no apical light band on the third tarsal joint of the hind legs. Such differences point, of course, toward breaking down these subspecies, and seem to make it desirable to keep all at one very variable form, with. certainly nothing more definite than varieties under it.

Stegomyia fasciata Fabr., is common at certain times, all over the Island where collections have been made, but these periods are by no means coincident. Both the varieties *mosquito* Desv., and *luciensis* Theo., are frequently found, and a variety equivalent to *luciensis*, *i. e.*, with black tip on the apex of the last tarsal joint of the hind legs, has been found under *S. scutellaris* Walker.

Culex fatigans Wied., shows remarkable variation in wing venation, the stem of the first fork cell being at times almost as long as one half the length of the cell.

New species must, of necessity, arise where variations are so marked, and of the earliest to be recorded, those described below, the first found in the hill district of Abra, a distinctly mountainous province, full of rugged scenery, and the second from Bulacan, one of the most malarial parts of Luzon, will be of some interest.

Anopheles philippinensis, sp. nov.

Female.—Head very dark brown, with white and creamy (yellowish) scales scattered on top, and more thickly toward the front, long white tuft in front, a few yelowish scales on the sides, and very dark forked scales with fimbriated tops on the occiput; antennæ golden brown, some white scales and some brown at the base with lighter tips, verticels white, pubescence white, first joint basally brown but white as apex; eyes dark brown or black, with very narrow white rim; palpi golden brown, some scales apparently darker tipped, the last joint white and a narrow white band at apex of each of the three preceding joints, a few white scales at the base; proboscis brown, not so dark as the head but darker than the antennæ; white or yellowish tip.

Thorax very dark brown (both it and the head are almost black), with scattered white, flat and yellowish curved scales, no design apparent, cephalad the white scales are much longer; scutellum dark brown in the middle and at each end with a lighter spot between on which are a few white scales; metanotum dark brown; pleuræ dark brown with white marking; when denuded thorax has ashy-gray reflections with dark brown median line.

Abdomen dorsally is ashy-gray with golden-brown hairs, a narrow brown apical band on each segment, much broader on the last two segments so that they are nearly brown instead of gray.

Legs.—Coxæ brown, all white-tipped, femora dark, *i. e.*, brown-scaled dorsally, and yellowish on the ventral side, tibiæ same but a very small apical white spot on fore and mid legs; metatarsus and two following joints on the fore legs have heavy apical white bands, mid legs have faint white bands in the same positions, that on the metatarsus much the heaviest, but still not by any means so broad as on the fore legs; hind legs dorsally brown, and yellowish ventrally, much as in the other legs, but the apical half of the first tarsal and all the following joints pure white; ungues on hind legs white, on mid and fore legs brown.

Wings cream-colored spotted with brown, reminding one of *A. jamesii* Theo. Two small and four large brown spots on costa, the distal extending back through anterior fork of second longitudinal, the next somewhat larger, through first longitudinal, the third and largest of all extends as a long spot on the costa and subcosta and three small ones on the first longitudinal, so arranged as to resemble an overturned E (m) ; the middle of these is the largest and connects with the one on the second longitudinal ; the fourth spot (counting from the apex of the wing) includes the subcosta and first longitudinal, and even the two small ones include the subcosta, making all these costal spots very distinct. The apex of the costa is, however, light. There are two dark spots on anterior fork of second longitudinal, and one on the posterior fork ; two small spots at the base of the third longitudinal ; one on the anterior fork of the fourth longitudinal, a small one near the apex of the posterior fork, the stem is dark to posterior cross-vein, and after a small white spot, about one-half the way to the base of the vein ; anterior fork of fifth has three dark spots, and there is one on the posterior near the apex, also on the stem of fifth near base o wing ; there are three dark spots on the sixth longitudinal, one at the apex, one near the middle, and one near the base. A large part of the second and fourth are therefore dark, while the fifth has a large part cream-colored and still a larger proportion of the third is light. The fringe is mottled, cream and brown, nearly equally to the to the sixth longitudinal, after which it is dark. Dark spots occur in the fringe at the apex of the anterior fork of the second longitudinal and at apices of the first posterior, second posterior, third posterior, anal, auxiliary, and spurious cells (Theobald's naming) with light spots at the apices of each intervening vein. The first submarginal call is a little longer than the second posterior, the base of the former being a little nearer the base of the wing. The posterior cross-vein is about one and one half times its length nearer the base of the wing than the mid cross-vein, and the supernumerary vein a little nearer the apex of the wing than the latter. Length (including proboscis) 5 mm.

Habitat, San José, Abra, Luzon, P. I.

Caught Sept. 1, 1901.

This mosquito is related *A. jamesii* Theo., but differs in so many points — antennæ, palpi, wings, legs — that although the differences in antennæ and wings are not great, those of the palpi and legs are so distinctive I have, after some hesitation, decided to keep it a distinct species.

Anopheles pseudobarbirostris, sp. nov.

Female. — Head very dark brown, with some pale scales on top, spreading in front toward the sides, and partly around the eyes, tuft in front white with a few dark hairs, and dark hairs behind the eyes, otherwise covered with rather broad not deeply forked scales with fimbriated tops, the tips gray ; narrow median space bare. Antennæ a lighter brown, minute white apical bands on the joints, first joint brown ; verticels brown, pubescence white. Palpi very heavily scaled with dark brown (almost black) scales, many of which are ochraceous tipped, so that the effect is "rusty," joints obscure but can be seen by breaks in the scales ; as long as the proboscis ; last joint with brown hairs. Proboscis also heavily dark scaled, some ochraceous tipped ; tip is lighter but still brown. Eyes dark brown, narrow white rim part of the way round.

Thorax dark brown with gray reflections, and narrow curved (almost hair-like) golden scales, arranged in faint *i. e.*, indefinite lines, which in some lights seem to converge so as to form a "V" from the cephalic edge the whole length of the thorax, the point caudad; pleurae brown with white markings; scutellum brown at center, paler laterad, with slender golden curved scales (such as are on the thorax) and golden bristles; metanotum brown.

Abdomen dark brown, slight grayish reflections, golden hairs; on the ventral side are a few scattered white scales and near the caudal end a bunch of rather long brown scales.

Legs.—Coxæ and trochanters all dark brown, white-tipped; femora and tibiæ all dark brown, well sprinkled with white scales, the rest of the legs a little lighter brown and in some lights giving almost "fawn-colored" reflections; all the joints of the legs and feet are white-tipped, except the last tarsal joints, and on the mid legs that is a little lighter, giving almost "clay-colored" reflections. Ungues simple and brown. Wings dark with two small yellow spots on costa, one at the apex of the wing and extending on the apices of the first longitudinal and anterior fork of second longitudinal with light spots on the fringe at apices of first longitudinal and anterior fork of second longitudinal and an included dark spot at apex of marginal cell, giving the appearance of an incomplete ring (c); the other, much smaller, on the costa at junction of the subcosta. The costal and basal portions of the wing are dark-scaled with a few white scales on the costa, subcosta, first and second longitudinal, but the third longitudinal is mostly white-scaled, and on this appear a few of the round-ended scales. The fourth longitudinal is largely dark-scaled with a few of the longer scales, but the scales are mostly of the roundish sort which are either black or white; there are dark spots at the apices of each fork and light fringe at the apex of the anterior fork. The fifth longitudinal has almost exclusively the rounder scales, and is mostly white, both as to stem and forks; dark spots at the apices of each fork, and the stem has a dark base, as have all the veins except the sixth, which is light-scaled, save two heavy dark spots, one at the apex and one about the middle of the vein. The sixth has entirely the roundish-ended scales in both black and white. The fringe is dark except for the three small places indicated, *i. e.*, at the apices of first longitudinal anterior fork of second and anterior fork of fourth longitudinal. Most of the veins, even where light, have a sprinkling of the dark among the median scales, but the larger part of the dark scales on these veins are lateral scales and lie close under the median scales, so that the wing looks much darker from the under (ventral) view, and in all the veins caudad of the third the lateral as well as the median scales are almost entirely of the "3-round-ended" sort. The wing has, however, as a whole a dark rather than light appearance, probably due to the very heavy scaling of the first two or three veins, which are mostly dark-scaled. The first submarginal cell is a little longer and narrower than the second posterior, the base of the former nearly on a line with the base of the latter, but not near the junction of the costa and subcosta; the stem of the former is about two thirds the length of the cell, and shorter than that of the second posterior, which is longer than the cell. The cross-veins are close to gether, the mid-vein much the longest, meeting the supernumerary at nearly a right angle (toward the apex of the wing), and the posterior cross-vein is not half its length from the mid-vein and stands at almost the same angle in the reverse direction. The halteres have black knobs, stem and base are light. Length 5 mm. (with proboscis 7 mm.).

Habitat: Hagonoy, Bulacan, Luzon, P. I.

Caught Oct. 2, 1901.

We have there one of the *sinensis* group, but evidently near *A. barbirostris* van der Wulp, the "round-ended" scales being undoubtedly the same as those described by Theobald for that species and apparently more numerous and wider spread on the wing than is indicated for that, while the differences in antennæ, palpi, wings and legs, especially the latter, are so marked as to throw it out of that species.

NOTE ON CULEX ANNULATUS.

By C. S. Ludlow.

Culex annulatus Schrank has been heretofore regarded as of doubtful occurrence in America. Giles "Mosquitoes or Gnats," new edition, p. 392, reports it as "doubtfully recorded from America," and in the British Museum Monograph (Theobald) in the lists for localities it stands, p. 108, under "North America and Canada," "*Culex annulatus* Meigen (?)," while on p. 334 a quotation from Osten Sacken is given, "the following note occurs on *C. annulatus* 'Mexico, Cuidad in Durango, 8,100 feet (Forrer), a single female from Cuidad agrees very well with this species.'" I am therefore glad to be able to report that a single male, in fine condition, all the markings clean cut and well defined, was taken by me in my house, March 1, 1902, Fort Baker, Marin Co., Cal. It is probable that this was a hibernating specimen as no others of any sort were found for more than six weeks afterward, and this was taken in a particularly warm and sunny room.

NOTES ON CICINDELIDÆ OF LOUISIANA.

By Charles W. Leng, B.S.

These notes are mainly extracts from letters of Mr. George Coverdale, who has collected for the last two years at Vowell's Mill and at Covington. Vowell's Mill is in Nachitoches parish in the northwestern part of the state, and the vicinity is a vast stretch of uncleared woodland, the trees being principally pines and oaks. The woodland is interrupted by sandy fields planted in cotton and corn, and by extensive swamps, heavily timbered with gigantic oaks, hickory, beech, maple, elm, ironwood, magnolia, poplar, sycamore, sweet gum, tupelo, sassafras, and, in the wetter portions, cypress. The species collected at Vowell's Mill are:

I.

Tetracha carolina and **T. virginica.**

Only a few specimens have so far been collected, and these were found running about in the hot midday sunshine of August in an old field grown up with grass and weeds, or running along the rows of cotton. They run rapidly, like a *Carabus* or *Cicindela.*

Cicindela unicolor.

This species begins to appear about February 10 and is abundant through March, April and May. It is not found during the summer months, but appears again in August and September. Mr. Coverdale is of the opinion that this so-called "fall brood" is all gone by the end of September. It is found only on white sand. The numerous specimens collected vary in the shade of color, but are all conspicuously green and unspotted. So far, at least, no specimen has been seen which had any of the spots of *rugifrons.* Compared with specimens from other localities these Louisiana specimens are more evidently punctate.

Cicindela sexguttata.

This species appears in March and is abundant during April and May and a few specimens are also found in June. It does not appear at all during the fall. Mr. Coverdale is quite positive on this point and speaks of this species as "single-brooded." It occurred especially on a woodland path, cut three years ago, and on the public highway near by, which has been cut since the war, or about forty years ago. This species is especially variable in Louisiana in coloring and in maculation. The color varies from bright brassy green to a pure grass-green, and the legs are often blue rather than green. Bluish reflections on the elytra are less common than in northern specimens. The maculation varies from the immaculate form, sometimes erroneously (?) called *violacea* to a single spot at apex, or a single spot on the disk (probably the *varians* of Ljungh), and so on to two, three or four spots on each elytron. The instability of this race of *sexguttata* is interesting in connection with the recent origin of its home and suggests the possibility of the race being at present under the influence of some evolution process.

Cicindela denverensis.

This species is represented by a single specimen taken with the following species.

Cicindela ludoviciana.

This species appears in February and continues abundant during March and April. In May the number commences to diminish, and from June to September there are none. A second brood appears late in September and continues until December. It is partial to red rocky or gray colored soils. A certain amount of moisture in the soil seems to be necessary for the development and appearance of Cicindelæ in the imago state. Last autumn Mr. Coverdale traveled a certain road four times daily (Sundays excepted) for three months. The summer has been extremely hot and dry and not a single specimen of *Cicindela* was found. During the night of October first a good rain fell, the first for five months, and the next morning Mr. Coverdale found *C. ludoviciana*, *C. splendida* and *C. vulgaris* all freshly emerged and abundant, where before the rain not a single specimen was to be seen. This species is closely related to *C. splendida* and occurs over a considerable range at Vowell's Mill associated with it. Mr. Coverdale noticed, in taking them that they seemed to occur at first in colonies, each form by itself. The first day of their appearance he found five specimens of *splendida* within ten or twelve feet of one another. Then he found *ludoviciana* only for a half mile without any *splendida*, then a few more *splendida* and so on all day. But after four or five days both forms occurred singly. This species is distinctly blue all over and varies only in the maculation.

Cicindela splendida.

Occurs with the preceding and has the same range and times of appearance. It varies in the intensity of the cupreous coloring, none of the specimens being as bright as more northern specimens, some specimens having an almost equal mixture of red and green. It varies also in the maculation, none of the specimens being heavily marked and some being immaculate.

Cicindela vulgaris.

This species is found from February to October, being scarce in midsummer. It is very abundant but rather local in the vicinity of

Vowell's Mill. The specimens received are all dark in coloring and suggest the tendency to partial obliteration of the markings observed in other southern specimens of this species.

Cicindela repanda.

This species is represented by a few specimens taken in June. Mr. Coverdale has not sent any particular information in reference to it.

Cicindela punctulata.

Occurs in June and is locally very abundant. The specimens are all very dark in color, nearly black, with the punctuation greenish and sometimes with white spots on the elytra.

Cicindela tortuosa.

This species is represented by a single specimen taken in August.

Cicindela cumatilis.

Occurs from June to August over a considerable range of country (fifty miles at least) mostly on red clay formation. Mr. Coverdale mentions this species occurring in the country school house, apparently interested in the crumbs of food dropped by the children at noon recess. It is very constant in respect of its beautiful blue coloring but quite variable in the extent of the white spots of the elytra.

II.

The species collected at Covington in June, 1902, are fewer in number. Covington is in St. Tammany Parish, in the southeastern part of the state, and near the northern shore of Lake Ponchartrain. The vicinity of Covington is flat and low; there are pine woods in which the trees are small and dense and the soil "crawfishy," soft when wet but hard as a rock when dry. At the time of Mr. Coverdale's visit, there had been no rain for five weeks, the vegetation was largely burnt up and dead, and the trees were covered with a fine impalpable white dust, which was also ankle deep on the roads. Nearby flows the Bogue Falaya River, and the best collecting was found along its sandy banks and in the woods immediately above them and on the sandbars exposed by the low water in the river. On the wet sands near the water's edge were *Cicindela tortuosa* and *repanda*, on the bars themselves *Cicindela Wapleri* and on the banks, partly in the shade of the trees, were *Cicindela abdominalis* and *punctulata*. Many Carabidæ were also taken on these sandbars and, in the stagnant pools between them and the banks, many Dytiscidæ.

To the south of Covington approaching the lake the character of the vegetation gradually changes. Palmettos begin to appear, then swamp timber such as water oaks, tupelo, magnolia, hackberry and cypress. In this region *punctulata* only occurred. The heat (June 15) was intense, the thermometer stood at 100° in the shade, and collecting Cicindelidæ on a snow white sandbar in the blazing sun was hard work.

Tetracha carolina.

This species was found in a low wet seepy place beside the river, running about on the wet sand, hiding under pieces of bark, rocks, logs, etc. Mr. Coverdale says it may be crepuscular in habit, but it is a "light sleeper" and can be found easily in the day-time by kicking pieces of bark, etc. It was also found on Mandeville Beach, Lake Pontchartrain, in the cracks of dried-out mud. Jumping on the mud made the beetles run out and pouring water down the cracks produced a good many. They run like a race horse and are difficult to capture. They bite and scratch even in the alcohol bottle. They also come to the electric lights.

Tetracha virginica.

A single specimen was taken at electric lights.

Cicindela repanda.

This species was taken on the sandbars of the Bogue Falaya River.

Cicindela punctulata.

This species was taken on the upper banks of the river and at various places in the woods and roads. The specimens sent are more metallic than the Vowell's Mill specimens. This species was also collected at electric lights.

Cicindela tortuosa.

This species was abundant on the sandbars of the Bogue Falaya River, living on the wet sand close to the river's edge. The specimens received are all very dark in color, but are probably stained by long immersion in alcohol.

Cicindela Wapleri.

The capture of this species was the main object of Mr. Coverdale's trip, and happily it was successfully attained. The clue was taken from Professor Wickham's "Habits of N. A. Cicindelidæ," where the capture of this species by the late Hugo Soltau is recorded "on the sandy banks of a small stream near Covington." The Bogue Falaya seemed to be the stream intended, though it is of considerable size, and steamboats from New Orleans cross Lake Ponchartrain and ascend it twice a week. Mr. Coverdale first tried the left bank, but was turned back by barbed-wire fences and trespass signs and finally tried the right bank. The banks at this point are mostly steep, composed of pure white sand, and about every half mile there is a sandbar below the banks. The chief growth on the banks is birch, willow, cypress, sweet gum, tupelo, magnolia, sweet bay, laurel, pine, pecan, ash and various smaller bushes, and in places passage through the tangled vines and shrubs becomes almost impossible. At last, after three hours' search up the stream, he found a sandbar white as the driven snow, on which they were running everywhere, sometimes two or three being caught in the net at one sweep. They are hard to see, the white-haired ventral surface and white side markings making little contrast with the white sand. About two or three o'clock in the heat of the day, *C. Wapleri* gets in the shade under little bushes.

The specimens collected vary in size and in the extent of the white markings but not sufficiently to suggest any modification of the published descriptions.

Cicindela abdominalis.

This species occurs plentifully on the banks of the Bogue Falaya River above the water's edge and in the shade of the trees and bushes.

The following species, though not taken by Mr. Coverdale, have been reported from Louisiana, viz: *Pilatei*, *obsoleta*, *cursitans*, *severa*, *hamata* and *pamphila*.

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NEW ORTHORRHAPHOUS DIPTERA FROM MEXICO AND TEXAS.

By D. W. COQUILLETT.

In the early part of the present year arrangements were made by Dr. L. O. Howard for identifying a large series of Diptera collected in Mexico and the southwestern portion of this country by Mr. C. H. T. Townsend, and the task of identifying this rich material was assigned to the writer. A comparatively small number of the species proved to be new to science, and as manuscript names of these will soon be sent out it is deemed desirable to publish the descriptions at as early a day as possible. The present paper deals with the new forms belonging to the section Orthorhapha.

Family CULICIDÆ.

Culex cyanescens, sp. nov.

Black, the stems of the halteres and the femora except their apices, yellow; occiput rather densely covered with broad, appressed, yellow scales and narrow, upright, yellow ones changing to black at the sides and posterior edge, a spot of violet blue appressed scales near middle of each outer edge of the occiput; palpi covered with broad, appressed, violet blue scales; mesonotum and scutellum rather densely covered with broad, appressed, brassy yellow scales, the pleura with whitish ones; abdomen densely covered with deep blue scales, the posterior angles of each segment, whole of the first and of the venter covered with brassy yellow scales, the spots at the posterior angles of the segments considerably produced forward at their inner ends; scales at apices of femora, on hind tibiæ and front side of the others, also on tarsi, violet blue; tarsal claws large, one-toothed; wings grayish hyaline, veins chiefly blue, lateral scales narrow and elongate, petiole of first submarginal cell four-fifths as long as the cell, posterior cross-vein about its own length from the small; length, 4 to5.5 mm.

Habitat: Brownsville, Texas.

Type: Cat. No. 6308, U. S. N. M.

Six females collected in May and on June 4.

Family PSYCHODIDÆ.

Trichomyia cirrata, sp. nov.

Brown, the antennæ, pleura and legs except the tarsi yellow; antennæ nearly as long as the body, the joints beyond the second over three times as long as wide; occiput, body and legs rather densely covered with appressed yellow scales, sides of mesonotum densely long yellow pilose, nearly extending to the middle of the anterior end, several rather long yellow hairs near apex of abdomen; wings narrow and pointed, sublanceolate, covered with pale yellow and dark gray hairs, fringe on the posterior margin almost half as long as greatest width of wing, petiole of first submarginal cell less than half as long as that cell, petiole of the second posterior cell less than one fourth the length of the cell; length, 1 mm.

Habitat: Frontera, Tabasco, Mexico.

Type: Cat. No. 6309, U. S. N. M.

Four female specimens collected March 26.

Family TABANIDÆ.

Pangonia seminuda, sp. nov.

Black, the antennæ and palpi reddish-yellow, halteres and knees dull yellow, abdomen varying from reddish-yellow to black; head yellowish-gray pruinose, ocelli present, third antennal joint near base much wider than the second, the apical annulus as long as the four preceding, palpi slender, sublanceolate, falcate, proboscis as long as thorax, face receding below, eyes bare, hairs of occiput and cheeks yellowish-white; thorax, scutellum and first abdominal segment opaque, densely gray pruinose, covered with short, pale yellow hairs, remainder of abdomen polished, its hairs black; wings grayish hyaline, strongly tinged with yellowish at base and along the costa, first posterior cell closed, upper branch of third vein bearing a long appendage near the base, calypteres white; length 18 to 22 mm.

Habitat: Sierra Madre, Chihuahua, Mexico (head of Rio Piedras Verdas, about 7,300 feet altitude).

Type: Cat. No. 6310, U. S. N. M.

Seventy-two males and forty females collected August 18 to 27.

Tabanus maculosus, sp. nov.

Near *aurantiacus* but the dorsal dark vitta of abdomen interrupted, the whitish median triangles confined to the first four segments, wings apically of a purer hyaline, etc. Head black, front of female distinctly narrowing anteriorly, the callosity polished, nearly square and with a linear or sublanceolate prolongation above, remainder of head gray pruinose and whitish haired except a spot on vertex and another near middle of front of female which are blackish and with many black hairs; proboscis and antennæ black, the first segment of the third joint of the latter with a low, blunt process; palpi slender, gradually tapering toward the apex, brown, its hairs yellowish-white intermixed with a few black ones; eyes sparse pubescent, purplish-brown and marked near the middle with two transverse oblique greenish stripes, no ocellar tubercle; thorax black, mesonotum polished, its hairs black except five stripes and those on the anterior end which are yellowish, the outer two stripes on each side united at the suture; pleura gray pruinose, its hairs yellowish-white except a large spot of black ones behind center of mesopleura; scutellum black, its hairs concolorous; abdomen on sides of first four segments broadly yellow, polished, with chiefly yellow hairs, the middle of each segment with a whitish pruinose, whitish haired triangle surrounded in front and at the sides with a brown, black-haired, somewhat Λ-shaped spot, the whitish triangles smallest on the first segment; last three segments black, somewhat polished, with black hairs, the sides narrowly yellow and with many yellow hairs; venter yellow, the last two segments largely brown; legs black, bases of tibiæ yellow; wings hyaline, costal cell yellowish-brown, base of wing to discal cell and along the costa tinged with smoky brown, a large brown spot on veins at base of second submarginal cell and of each posterior cell, first posterior cell strongly narrowed at apex, upper branch of third vein without an appendage, calypteres yellowish-brown, knobs of halteres yellow; length, 15 mm.

Habitat: Same as the preceding species.

Type: Cat. No. 6311, U. S. N. M.

One male and six females collected May 31 to June 3.

Family BOMBYLIDÆ.

Anthrax extremitis, sp. nov.

Black, the knobs of the halteres yellow; face greatly produced below, third antennal joint elongate conical at the base, hairs of the two preceding joints of the front and face black, tomentum of the two latter black mixed with yellowish, proboscis not projecting beyond the oral margin; mesonotum thinly grayish pruinose, its hairs chiefly black, those at the ends and sides, also on upper edge of pleura pale yellow, on remainder of pleura and on breast black; hairs of abdomen pale yellowish mixed with black ones on the sides and dorsum of the last two segments; tomentum of abdomen black, that on the last segment white, hairs and tomentum of venter black; front tibiæ bearing a few bristles, front tarsal claws well developed, pulvilli wanting; wings hyaline, the base brown, the outline of this color extending from apex of auxiliary vein obliquely to first submarginal cell near its base, then transversely to discal cell, then obliquely nearly to base of this cell, then curving through base of fourth posterior cell and obliquely through anal cell and upper basal angle of the axillary cell; cross-veins within the brown area not bordered with subhyaline; length, 9 to 11 mm.

Habitat: Sierra Madre, Chihuahua, Mexico (head of Rio Pedras Verdas, altitude about 7,300 feet).

Type: Cat. No. 6312, U. S. N. M.

Fourteen specimens collected August 11 to 29.

Family ASILIDÆ.

Saropogon dispar, sp. nov.

Male.—Black, the halteres yellow, femora with a reddish-yellow vitta on the front side connected at the apex with a shorter one on the posterior side, hairs and bristles whitish or pale yellow, the short bristly hairs of mesonotum largely black, the hairs of abdomen and of last two pairs of tibiæ largely black; head, thorax and upper side of scutellum densely yellowish-gray pruinose, mesonotum marked with three blackish vittæ, the median one divided by a gray line; abdomen tinged with blue, the sides of the first segment and hind angles of the following three gray pruinose; wings brown, darkest along the costa and at the apex.

Female.—Antennæ and legs reddish-yellow, a black vitta on upper side of all femora and also on under side of the middle and hind ones, short bristly hairs of mesonotum and hairs of tibiæ yellow, wings smoky, the costal cell brownish-yellow, apex of wings blackish, otherwise as in the male; length, 20–23 mm.

Habitat: Cuero (June 6), and Columbus (E. A. Schwarz), Texas.

Type: Cat. No. 6313, U. S. N. M.

Seven males and seven females.

Pycnopogon divisus, sp. nov.

Male.—Black, the knob of the halteres yellow; hairs of occiput pale yellowish, a transverse row of black bristles on the upper part, hairs of front pale yellow, those next the eyes black, hairs of middle of face sparse, pale yellow, those on the sides and the very dense fringe above the mouth black; thorax somewhat polished, its hairs and those of the scutellum pale yellow; abdomen polished, the broad bases of segments two to six opaque, hairs of dorsum very short, sparse, depressed, black, those of the sides and venter very long, dense, yellow; hairs of femora yellow, many black ones at apices of the front and hind ones and a fringe of black ones on the upper and under sides of the apical third of the middle femora; hairs and bristles of front and hind tibiæ chiefly black, of the middle tibiæ chiefly white and with a fringe of black ones on the outer and inner sides near the base; hairs and bristles of tarsi sparse, black, a dense patch of long white hairs on upper side of first joint of the front ones; wings hyaline.

Female.—Differs from the male as follows: Black hairs on sides of front and of face few in number, sixth abdominal segment wholly polished, hairs of middle femora colored like those on the other femora, hairs and bristles of middle tibiæ chiefly yellow, those on the outer side mostly black, no patch of white hairs on the front tarsi; length, 12 mm.

Habitat: Sierra Madre, Chihuahua, Mexico (head of Rio Piedras Verdas, about 7,300 feet elevation).

Type: Cat. No. 6314, U. S. N. M.

Seven males and three females collected September 17 and 18.

Family EMPIDÆ.

Sciodromia palliata, sp. nov.

Head blue-black, eyes narrowly separated on the front, contiguous on the face. antennæ brown, proboscis yellow, rigid, nearly as long as height of head, thorax blue-black, mesonotum polished except a shield-shaped, silvery white spot on the posterior end, lower portion of pleura and upper side of scutellum whitish pruinose, hairs and bristles of thorax black, scutellum bearing four bristles; abdomen steel, blue, polished, its hairs whitish, genitalia black and with black hairs; legs yellow, including the coxæ, tarsi becoming brownish toward the apices, outer side of hind tibiæ bearing many long hairs; wings hyaline, stigma pale grayish, the upper two veins that issue from the discal cell very faint; halteres yellow; length, 2 mm.

Habitat: Frontera, Tabasco, Mexico.

Type: Cat. No. 6315, U. S. N. M.

Four males collected February 19.

Family DOLICHOPODIDÆ.

Sciapus* breviseta, sp. nov.

Head green, the hairs white, the bristles above anterior oral margin and on the front black; front deeply excavated, polished, the lower edge and face rather densely white pruinose, face slightly impressed below the middle, destitute of hairs, antennæ black, the third joint dark brown, transversely elliptical, bristles on under side of second joint shorter than greatest diameter of this joint, arista slender, less than half

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* *Sciapus* Zeller, 1842 (= *Leptopus* Fallen, 1823, preoccupied; = *Psilopus* Meigen 1824, preoccupied; = *Gnamptopsilopus* Aldrich, 1893). In the Mon. N. Am. Diptera, II, page 230, Dr. Loew states that all of the European species of *Psilopus* have the hairs of the calypteres whitish, and the specimens in the U. S. National Museum agree with this statement. It is probable that one of the many names proposed by Bigot will be available for those species in which these hairs are black, but unfortunately he makes no mention of this character and specimens belonging to the type species are not at present accessible to the writer.

as long as the body, proboscis yellow, palpi black; body greenish, base of first abdominal segment, a rounded spot at base of third extended across the second, also bases of fourth and fifth black, segments six and seven steel blue, hypopygium brown, without bristles, claspers rather robust, each bearing a large lobe on the inner side before the tip, many white hairs on sides of first three abdominal segments, pleura rather densely white pruinose, hairs of calypteres black, scutellum bearing four large bristles; coxæ greenish, apices of front ones yellow, femora blue black, the apices yellow, tibiæ yellow, narrow apices of the hind ones brown, tarsi brown, bases of the front and middle ones yellow; under side of femora fringed with rather long white hairs and toward the apex with several black bristles; front tibiæ bearing about five rather long black bristles on the inner-posterior side and with three short ones on the outer side, middle tibiæ bearing four rows of from two to four bristles which are rather short except those on the outer-anterior and the lower ones on the inner-anterior side, hind tibiæ bearing about three rather short bristles on the outer-anterior side; tarsi simple, first joint of front ones bearing about five rather long bristles on the posterior-under side; wings hyaline, a brown cross-band passing over the hind cross-vein and a second over the forking of the fourth vein, both bands united at their costal ends as far as the third vein; halteres yellow; length, 6 mm.

Habitat: San Rafael, Vera Cruz, Mexico.

Type: Cat. No. 6316, U. S. N. M.

Twenty-four males collected March 6 to April 4.

Sciapus longiseta, sp. nov.

Differs from *breviseta* as follows: Longest bristles on under side of second antennal joint over twice as long as greatest diameter of this joint, base of third abdominal segment with a narrow transverse spot, the sixth and seventh green, their bases black, claspers not lobed, femora almost pure black, front tibiæ with only three bristles on the inner-posterior side, none on the outer side, hind tibiæ bearing a single bristle, first joint of front tarsi bearing about two bristles, last two joints of hind tarsi dilated; length, 4 mm.

Habitat: San Rafael, Vera Cruz, Mexico.

Type: Cat. No. 6317, U. S. N. M.

Thirty-one males collected March 13 to April 4.

Sciapus clunalis, sp. nov.

Differs from *breviseta* as follows: Longest bristles on under side of second antennal joint over twice as long as greatest diameter of this joint, arista about two thirds as long as the body, base of third abdominal segment narrowly black, the sixth and seventh greenish with black bases, first segment of hypopygium bearing several rather long bristles, the last segment considerably swollen, the claspers unusually broad, each composed of two flattened oval plates, the outer one of which is attached to the inner near its base, femora greenish, front tibiæ bearing two rather long bristles on the inner-posterior, three short ones on the outer-posterior and two on the outer-anterior side, first joint of front tarsi bearing three bristles; length, 5 mm.

Habitat: San Rafael, Vera Cruz, Mexico.

Type: Cat. No. 6318, U. S. N. M.

A male specimen collected April 1.

A NEW PHALANGID FROM THE BLACK MOUNTAINS, N. C.

BY NATHAN BANKS.

Scotolemon brunnea, sp. nov.

Body yellowish-brown, shield of abdomen mottled with irregular blackish markings; posterior margins of ventral segments, and of the last few dorsal segments margined with black. Palpi and mandibles yellowish-brown, irregularly netted with black; legs mostly blackish, but with some yellow markings, especially on the patellæ. Eye-tubercle large, but blunt, and not far from the anterior margin. Dorsum of abdomen beyond middle with some acute granules, arranged, especially on the hind margins of the posterior segments, in transverse rows, each granule is tipped with a short, stout bristle. The coxæ and ventral surface granulate, larger granules on the hind margins of coxæ; ventral surface with some erect, short hair. Legs slightly roughened and with short bristles. Tarsus I four-jointed, basal joint rather longest; tarsus II eight-jointed, penultimate longest, tarsi III and IV are four-jointed, the basal much the longest. Tibia II has two or three false articulations. Palpi large and prominent; coxæ with one spine below; femur with four spines above, the basal two smaller than the others, two spines on inner side near tip, the basal one the longer, below with four tubercles bearing spines and a group of smaller tubercles beyond; patella with two long spines on inner side, one at middle and one near tip, under side with one spine near tip; tibia with three spines on outer side, the middle one much the longest, four on inner side, the second the largest, two small spines above; tarsus with three large spines on each side, the basal the largest; claw long and stout. The mandibles of the male have a large prominent projection in front, enlarged at tip, and below on outer side are several short bristles; there is also a tubercle near base of immovable finger; the movable finger is greatly swollen near middle and then bent at right angles. Length, 2 mm.

Several specimens collected by Mr. Beutenmüller in the valley of the Black Mountains, Yancy County, N. C., in September. They were found by sifting damp leaves in the woods.

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NOTE ON MAMESTRA VAN-ORBICULARIS SM.

In the description of the above species in the March number of the JOURNAL the specimen received was inadvertently credited to Prof. Washburn, formerly of Corvallis, from whom I had in times past received material. As a matter of fact the credit should be to Prof. A. B. Cordley who has been good enough to follow his predecessor in favoring the undersigned with noctuid material.

JOHN B. SMITH.

THE LIFE-HISTORY OF ELLIDA CANIPLAGA.

BY HARRISON G. DYAR.

This species, more commonly known as *Ellida gelida* Grt., has been a rarity in collections. Nothing has been recorded on its larva. Recently Mr. George Krautwurm, of Pittsburgh, Pa., in correspondence with the Department of Agriculture, mentioned that the larva was known to him and that he could supply eggs. Dr. Howard kindly turned over to me the material sent by Mr. Krautwurm and I obtained the following life history. *Ellida caniplaga* flies very early, in April. There is a partial second brood, flying at the end of June and first of July, and it is these scattering individuals that usually come into the hands of collectors. Mr. Krautwurm obtained some 75 pupæ from his lot of eggs at Pittsburgh, and none of these emerged the same season. Of the 20 pupæ which I obtained from a part of the same lot of eggs, but which were raised at Washington, D. C., all but three emerged the same season, or attempted to, for most of them were crippled. The food plant is the linden (*Tilia americana* Linn.). The little larvæ had hatched and were feeding on the young, undeveloped leaves when received. They rested on the backs of the leaves, curled in an incomplete spiral. The dark form of the mature larva is peculiarly marked.

Egg. — Shape of two thirds of a sphere with flat base and slight tendency to the conoidal form; ochreous flesh color or pale brown, not shining; a round, translucent luteous spot at the vertex; surface finely, obscurely, hexagonally reticulate, the reticulations smaller at the micropyle. Diameter 1.1 mm., height .7 mm. The larva issues by eating a semicircular hole at one side of the vertex.

Stage I. — Head rounded, bilobed, higher than wide, mouth pointed; erect; shining black, mouth and base of clypeus brownish; width .4 mm. Body cylindrical, normal, feet all used, but the anal pair slender; joint 12 with a large, cushion-shaped, dorsal hump; joint 11 weak and smaller, else the segments subequal. A small, narrow, transverse, cervical shield, small anal plate, the thoracic feet, leg plates and tubercles shining black. Body translucent yellowish-white, the food showing green; a rounded dorsal patch on joints 3 to 10 and 12, between tubercles i and ii and covering tubercles i, of dull red brown, shining like the skin, faint on joint 3, large and covering the hump on joint 12. Tubercles moderate, very distinct, rounded, rather prominent, normal, no subprimaries; ia and ib separate, iia and iib separate, iv on the abdomen behind the spiracle. Segments rather weakly annulate. Tubercles i on the apex of the hump of joint 12 are enlarged, separate. Sometimes there are no dorsal spots on joints 3 and 4. Setæ stiff, black. When first hatched the tubercles are not black, the dorsal spots are dull brown and diffuse while the one on the hump of joint 12 is blood red.

Stage II. — Head rounded quadrate, angled on the lower sides, flattened before, higher and wider than joint 2; clypeus small, vertex broadly shallowly notched, erect, dark smoky brown, broadly luteous in the sutures of the clypeus, vertices of lobes blackish, width .8 mm. Body cylindrical, joint 12 with a conical dorsal hump, nearly as high as the width of the segment; feet moderate, the anal pair about same size as the others, perpendicular, not extended backward. Segments obscurely 4-annulate. Not shining, whitish with a yellowish tint, translucent, the food appearing green. Cervical shield small, transverse, smoky; dorsal patches on joints 3 to 10 small, diffuse, dull brownish-red, the hump on joint 12 brighter red. Tubercles minute, concolorous, obscure; setæ small, slender, short, black. Feet all pale. Later the feet were testaceous, the head nearly uniformly dark brown; dorsal spots more distinct and rounded, marked in pale dots by tubercles i and ii. Rarely the spots are conjoined into a moniliform band, narrowed before, broken at joint 11. Still later there appears a broad, opaque, white, subdorsal band. The larva rests on the back of a leaf with the head curved and touching the middle of the body.

Stage III. — Head higher and broader than joint 2, higher than wide, convex flattened before, obliquely flattened towards vertex, rounded squarish, the vertex shallowly notched; mouth roundedly projecting; clypeus less than half to vertex; white on each side of the median suture above clypeus, else shaded with blackish luteous; vertices of lobes black, the patches conjoined narowly across the vertical notch; labrum pale; width 1.1 mm. Body moderate, a little smaller behind; joint 12 with a dorsal conical hump, not large. Anal feet slight, used. Segments 5-annulate. Whitish, translucent, a broad, opaque white, subdorsal band, weakly contrasted; dorsal patches red-brown, forming a confused band on joints 3 to 5, streaked on the annulets, on 6 to 10 and 12 forming neat round spots, very slightly elevated, marked in white by tubercle i and an annulet groove; a slight dot on joint 11 and on 13 anteriorly; the spots of joints 6 and 7 are produced backward a little on the dorsal line. No shields; tubercles and setæ obscure, concolorous, whitish. Another larva had the head white with brown-black dots at the apex of each lobe and on eye; subdorsal band yellowish; dorsal spots smaller, finally fading out except for tiny paired dots. The subdorsal line is widened and yellow-blotched on the segments and there is a narrow suprastigmatal white line and traces of a fine lateral one.

Stage IV.—Head shaped as before, held obliquely; yellowish-green over the lobes, clypeus and a space below the eyes greenish; a small, neat, elliptical, black patch on the summit of each lobe; eyes in a small black spot; labrum whitish, jaws yellowish at base, antennæ very small and pale; width 2.5 mm. Body slender, cylindrical, joint 12 with a sharp, triangular dorsal hump, more oblique before than behind, not as high as the diameter of the segment; segments coarsely 5-annulate, the incisures depressed. Feet normal, equal, resembling *Lophodonta*. No shields; transparent green, pulsations of dorsal vessel visible; an opaque subdorsal band, widened dorsally in the centers of the segments to touch its fellow, white on the edge, yellow below, the color darkest centrally on the segments; tip of hump on the anterior slope dark red or a blackish-red dorsal patch on the second annulet on joints 8 to 10 also. A narrow, straight line just below the broad subdorsal line and in part fused with it; similar lateral and suprastigmatal lines uniformly pale yellow. Tracheal line visible; spiracles whitish; no marks below; setæ short, whitish, the tubercles invisible. Later the dorsal spots faded to a faint vinous shade, but leaving a dark dot on tubercle i. In the pale larva a narrow white line appeared subventrally. The larva rests on the vein of a leaf, the body curled in a half spiral, the head crossed over the middle of the body and elevated.

Stage V.—Head rounded, higher than wide, vertex retreating, shallowly notched; clypeus small, slightly depressed, labrum incised at sides, emarginate, with the mandibles forming a rounded, projecting mouth; pale green, slightly shagreened, yellow shaded outwardly on the lobes and each side of median suture; a rounded black patch on summit of each lobe, over eye and covering distal three fourths of jaw; clypeus deeper green; antennæ small, slender, pale; width 3.5

mm. Body cylindrical, normal, joint 12 with a dorsal angled hump, forming a low, subconical projection, joint 13 tapering a little, else subequal, joint 2 smaller than the head. Segments coarsely 5-annulate, annulet 2 the highest. Translucent whitish-green, the feet very pale; subdorsal line opaque, yellow, white on annulets 1 and 5 and on its upper edge, widened dorsally on the segments to touch its fellow on the third annulet on joints 6 to 11, widened laterally on joint 2, but on the other segments straight on its lower edge. Three fine lateral lines (lower subdorsal, lateral and suprastigmatal), pale yellow, straight, the upper in part confluent with the subdorsal on annulet 1, the three separated by equal spaces of the translucent ground color. A broken, somewhat waved, narrow, pale, substigmatal line. Dorsal geminate dots of dark red more or less distinct on joints 5 to 8, dorsad of tubercle i on the slightly raised second annulet, a single spot on the summit of the hump on joint 12. Tubercles invisible, setæ minute, the dorsal ones dusky. This is the palest form. In others the red marks vary greatly. One had the dorsal spots large and single on joints 3 to 10 and 12. The darkest forms have the head nearly white, flushed with pink over the faces of the lobes; lines all yellow except the edge of the subdorsal next to the red spots. There may be an incomplete line of dark red between the subdorsal and lower subdorsal lines; dorsal dark red spots filling all the dorsum except for the subdorsal line. Or the whole larva may be shaded with dark vinous red, the color crossing the subdorsal line at annulet 1 and forming great blotches over the sides.

The larvæ formed slight cocoons in the earth. The change to pupa took place immediately, even in those individuals that did not emerge till the following year. The pupa is cylindrical, rather elongate and tapering slightly at both ends, smooth, rather light brown, shining. The cases are shagreened, the wing veins showing rather plainly; abdominal segments lightly, uniformly punctured, the three movable incisures finely granular. Cremaster a stout spine, terminated in a number of irregular hooks Length 20 mm., width 6 mm.

THE LARVA OF THE CADDIS FLY, MOLANNA CINEREA HAGEN.

By C. BETTEN.

HISTORICAL.

The material upon which this study is based was all collected at Saranac Inn, New York. For the most part, the specimens were taken from Little Clear Creek—the outlet of Little Clear Lake, one of the innumerable beautiful lakes of the Adirondacks. In this region caddis flies were found to be very abundant. During the ten weeks succeeding June 15, 1900, almost a score of different larvæ were found, while upwards of thirty species of adults were caught. Of the latter the greater number were secured by means of trap lanterns. Conspicuous among these many species was *Molanna cinerea* Hagen, the subject of this study. The interesting character of this larva, the fact that it was successfully reared, and above all, its presence in such large numbers, were the considerations that led to its selection for a more detailed study.

The amount of work already done along this line is exceedingly small. In fact the Trichoptera are a somewhat neglected order. For the adults, to be sure, we have MacLachlan's* great monograph of the European fauna. The immature stages however have received scarcely any attention. Their natural history is fairly presented in Miall's Natural History of Aquatic Insects. This account consists almost exclusively in extracts from the work of Reaumur. Professor Patten† gives us the embryology of one species. Professor K. J. Morton,‡ F. J. Pictet,§ Fr. A. Kolenati‖ and Miss Cora Clarke¶ are among those who have described various species. The glands of the thorax have been carefully studied by Professor Gilson[*] and M. Maurice Henseval.[†] They reach the conclusion that these glands have a nephridial function. Professor Lucas[‡] presents a detailed account of the metamorphosis of the mouth parts and salivary glands of *Anabolia furcata*.

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*MACLACHLAN, ROBERT. A monograph revision and synopsis of the Trichoptera of the European Fauna. 1879.

†PATTEN, WILLIAM. The Development of Phryganids. Three pl. Quart. Journ. Micros. Sc., Vol. XXIV, pp. 549–602.

‡MORTON, K. J. Notes on the Metamorphosis of British Leptoceridæ. 1890. Entomol. Month. Mag., Vol. I, No. 5, pp. 127–131.

§PICTET, F. J. Recherches pour servir a l'histoire et l'anatomie des Phryganides. Genéve and Paris, 1834.

‖KOLENATI, FR. A. Genera et Species Trichopterorum. Pars I, Pragae, 1848, Pars II. Mosquae, 1859.

¶CLARKE, CORA H. Caddis flies of Stony Brook. Psyche, 1891. P. 153.

The most complete work on life histories is that of Professor Franz Klapàlek,[§] of Prag. This contains a general description of the cases, larvæ and pupæ of European Trichoptera. The body of the work consists of the description of the cases, larvæ and pupæ of forty-three species previously practically unknown. A statement of family characteristics makes this the best if not the only work available for the determination of immature caddis flies. Dr. Georg Ulmer is at present engaged with a similar work on the Trichoptera of Germany. In this connection should also be mentioned Professor R. Struck's[†] paper on caddis fly cases, in which a table is given for determination by means of the cases. One of the species described by Professor Klapàlek is *Molanna angustata* Curt., which seems to be a very close European relative of *Molanna cinerea* and much help has been derived from a comparison with this description. I have given a general account of this species with colored figures of all stages and of the case in Bulletin 47 of the New York State Museum.

EXTERNAL ANATOMY.

Larva.—The larva of *Molanna cinerea* was found in abundance until about the middle of August. Up to that time they were obtained with the greatest ease by means of a sieve net drawn through the sandy bottom where little or no vegetation appeared. Both the adult and larva of this insect are striking examples of protective form and coloration. The former by its color and its habitual posture with abdomen tilted upward and closely wrapped by the wings, exactly simulates a splinter or snag of wood, while the case of the latter, being made entirely of sand, could hardly be discovered, even if moving about in clear shallow water. This case consists of a slender tube with a wide sheath extending beyond on all sides, but farthest at the anterior end. It is therefore of a flat conical shape, rounded at both ends, with the greatest diameter at the anterior opening of the tube. Its length is 20 mm., its width 10 mm. Professor Klapàlek says that before pupation the larva of *Molanna angustata* removes the forward part of the sheath and that the sides are also often much narrower than in the larval stage. Such a condition of the case was frequently observed in *Molanna cinerea*, but was not invariable, and might at all events be due, in part at least, to the natural wearing away of the case which can no longer be repaired by the occupant.

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[*] GILSON, G. Journ. Micr. Soc. London, Pt. I, p. 30. Thoracic glands in larvæ of Trichoptera.

[†] HENSEVAL, M. MAURICE. Les glandes buccales des larves de Trichoptera. La Cellule, XII, pp. 1–12.

[‡] LUCAS, R. Beiträge zur Kenntnis der Mundwerkzeuge der Trichopteren. Arch. f. Naturg., LIX.

[§] KLAPÀLEK, FR. Metamorphose der Trichopteren, serie I and II, Archiv. der Naturwissenschaftl. Landesdurchforshung von Böhmen, Band VI, No. 5 and Band VIII, No. 6.

[‖] STRUCK, R. Illus. Zeitschr. f. Entomol., Band IV, Nos. 8, 10, 17, 19, 20, 21.

The larva is slender, with its head at an angle with the main axis of the body. Its length is 12 mm., its width 2 mm. The head and thorax are of a yellow color. The sutures of the head are bordered with black, forming with the suture of the pronotum a large Y, the arms of which join near the rear of the head. The antennæ stand just posterior to the bases of the mandibles. They consist of two joints — a broad conical one at the base, and a second shorter one which is in turn surmounted by a stout bristle of about its own length. The mouth parts are well developed. The labrum is of elliptical form — the forward edge almost straight. The mandibles are very strong, carrying two and three teeth on the right and the left side respectively. Along the outer edge of each mandible, stand two long bristles. The gula is a trapezoid in shape, longer than broad. It is of a dark brown color. The labium is thickly set with hairs at its base. The maxillary palpi are of a conical shape and are closely applied to the maxillæ. Each palpus has four joints, only the last extending beyond the maxillæ. On the inner edge of the maxillæ are three stout bristles. The labium is conical in shape, carrying on each side of its point a three-jointed palpus. At its very tip the opening of the salivary (silk) glands may be seen.

The thorax is of the same color as the head. The pronotum is more heavily chitinized than the other divisions. Its anterior edge is gently arched. The posterior edge forms two arches, the incision between which is continued to form the longitudinal suture almost to the anterior edge. The entire posterior edge is margined with black. The forward half of the mesonotum is covered with a chitinous shield which is divided longitudinally into two parts. Along this division are numerous brown patches. The rear half also has a brown spot just forward of its center.

The legs are yellow with the adjoining edges of coxa and trochanter black. The first pair is the shortest. It has many spurs along its inner edge. One is found at the distal end of the trochanter, three on the femur besides one at its distal end, one is placed on a distinct prominence near the end of the tibia, while a row of smaller ones runs obliquely across this joint. The tarsus carries one spur and still another is located at the base of the single claw. On the second pair of legs we find one spur on the distal end of the trochanter, ten along the inner edge of the femur with a stout one at the middle of the row, one on a prominence on the tibia, two on the tarsus and one at the base of the claw. The femur also carries numerous hairs on its outer edge. The third and longest pair of legs are quite different from the others. The large spurs are wanting, only the femur has its inner edge covered with black spines. The end of the tarsus is covered with a brush of thick hairs so that no claws can be distinguished. The femur has a

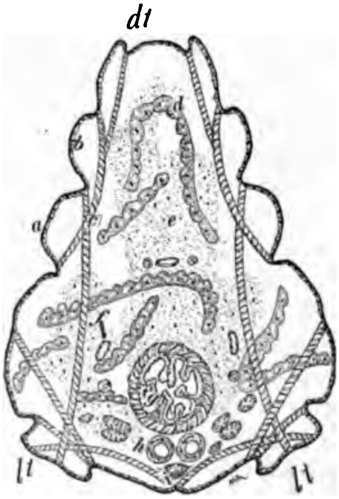
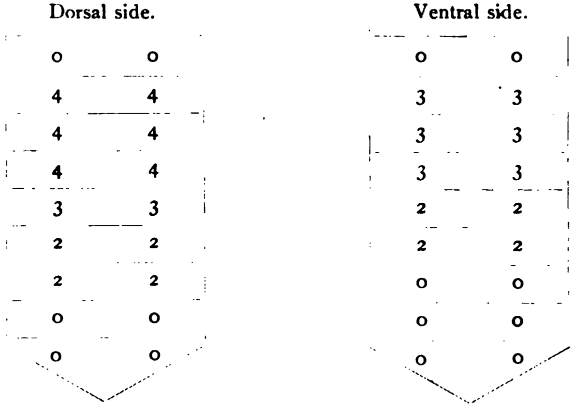


FIG. 1. Semi-diagrammatic cross-section of the larva through the first abdominal segment; *dt*, dorsal tubercle; *lt*, lateral tubercles; *a*, chitin; *b*, hypodermis; *c*, dorso-ventral muscles; *d*, fat masses; *e*, blood; *f*, malphigian tubules; *g*, crop; *h*, salivary glands; *i*, nerve cord. Drawing by Miss Maud H. Anthony.

transparent spot at its center. This pair of legs is more hairy than he others.

The abdomen of the larva is of a light color tinged with brick red. The first segment has three tubercles (Fig. 1), the upper one by far the largest. Respiratory filaments occur on six of the nine segments. They are placed at the forward edge of the segments, in two rows on both dorsal and ventral sides. Their number and position may be represented diagrammatically by the accompanying figures.



A fringe of hairs runs along the sides of the body from the third to eighth segment. Along the latter segment, the fringe consists of very stiff hairs set in pairs. The body is terminated by a pair of two-jointed prolegs. These carry strong hooks which point outward. At the base of each of the large hooks are two smaller ones.

INTERNAL ANATOMY.

The larva was found to be quite unfavorable for gross dissection, hence for the study of internal structure reliance has been placed chiefly upon microtome sections which were prepared by the ordinary methods.

The alimentary canal consists, as is usual, of mouth, gullet, crop, stomach, intestine and rectum. The second of these divisions is about straight; its walls are not convoluted and are surrounded by strong circular muscles. This division extends to the prothorax. The crop extends through the remainder of the thorax. Its strong walls are much convoluted, and its circular muscles are of great size, especially near the opening into the stomach. The region from the thorax to the middle of the sixth segment is occupied by the stomach. Here the circular muscles are smaller than around any other part of the canal. The stomach epithelium is arranged in regular folds with nests of regenerative cells between them. The stomach was found to be infested with Gregarinidæ which closely resembled the young Clepsidrina figured in Bronn's Klassen und Ordnungen.* The intestine extends to the middle of seventh segment. Its epithelium is arranged in six longitudinal ridges or cushions with thinner parts alternating. The cells of the cushions and their nuclei are large. The rectum occupies the remaining segments. The inner walls are much convoluted except in the last segment in which they are quite straight Its epithelium is made up of very large cells.

In late larval stages the metamorphosis of the stomach may be observed. The epithelium is cast off entire and is seen lying in the center of the canal. In its place there has developed a very even and thin epithelium. The six cushions again appear in the intestine as do also the large cells in the rectum.

The malphigian tubules enter the alimentary canal near the point where the stomach passes over into the intestine. They are six in number and extend in many loops through every segment of the abdomen.

The salivary glands occupy a conspicuous place in the internal structure of the larva. They extend through the greater part of the abdomen, lying in three main loops. Throughout the thorax they appear as two straight tubes lying under the alimentary canal. Between the subœsophagal and the first thoracic ganglion of the nervous system they pass below the nerve cord. The glands unite at the base of the labium and open as a single tube. In this part lies the apparatus for shaping the silk, which is minutely described by Lucas, in the work referred to above. A smaller pair of glands is found in the head, lying folded under the œsophagus.

The nervous system of this larva is very simple. Professor Klapàlek speaking of Trichoptera in general says there are eleven ganglia besides those of the head. In this larva ganglia were found in only six of the abdominal segments, making a total of nine besides the subœsophagal and supraœsophagal ganglia. Whether this is an exception to the general rule or whether the preparations were defective, is impossible to decide.

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* BRONN'S Klassen und Ordnungen des Thier-Reichs, Vol. I, Pl. 35, Fig. 9.

The blood system is likewise simple. The main blood vessel is easily distinguishable along the dorsal side. In cross section it appears triangular. Throughout the body there is a great deal of free blood.

The reproductive system is fairly well developed in the larva. The ovaries and spermaries lie in the fourth abdominal segment.

Mention should also be made of the numerous large œnocytes which lie near the body wall throughout a great part of the abdomen, and of the wing buds which appear very clearly in the mesothorax and metathorax as infoldings in the epithelium.

Reference has been made to the three tubercles on the first abdominal segment. It has long been known that these are retractile and protrusible and so serve to fix the position of the larva in its case and perhaps to regulate the flow of water through the case. How this movement is brought about has not been explained. The accompanying figure shows the simple muscular arrangement by which the retraction is accomplished. Besides these few muscles nothing was found in the tubercles, excepting blood and a small amount of fat. It is altogether probable that the protrusion is effected by a contraction of the body forcing the blood into the tubercles.

A NEW TYPE OF DERMAL GLAND.

We conclude our account of the larva with the mention of certain dermal glands (Fig. 2) which appear in the fourth, fifth, sixth, and seventh segments. Unless these glands are not common among the Trichoptera it is surprising that they should have remained unnoticed hitherto, for their size as well as the fine staining of which they are susceptible make them very prominent in sections made in any plane of the body. The dermal glands described by Andreas Martynow * resemble these more than any others that are described. That they are essentially different, however, is shown by the following points of contrast: they occur in the posterior segments of the thorax and in all the abdominal segments, they are unicellular and they open through the chitin by means of a canal. The glands of *Molanna cinerea*, on the contrary, are composed of many cells and have no openings through the chitin. These glands are at the middle of the sides of the body in the lower angle formed by one of the dorso-ventral muscles and the body wall,

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* **MARTYNOW, ANDREAS**, Über einige eigenthümliche Drüsen bei den Trichopteren, Zoöl. Anz., XXIV, pp. 449–455, 5 figs.

and in the upper angle formed by another dorso-ventral muscle wi the body wall. They lie near the anterior end of the segments name a little above the middle of the body so that the lateral fringe cross the glands below the center. The fact that they appear of the sa shape in both frontal and sagittal sections would indicate that th glands are round. Their diameter was estimated at one half the lengt of a segment, and their depth about one eighth or one ninth the widt of a segment. The gland cells are wedge-shaped and are evidently modifications of the regular epithelium. Their nuclei are granulated and have small clefts pointing to the mouth of the gland. They lie along the inner edges of the cells. Numerous vacuoles occur throughout the gland. Concerning the function of these glands nothing was learned. Their absence in the pupal stage might lead us to infer that perhaps they were concerned in the process of metamorphosis, as is known to be true of the dermal glands of certain other insects.

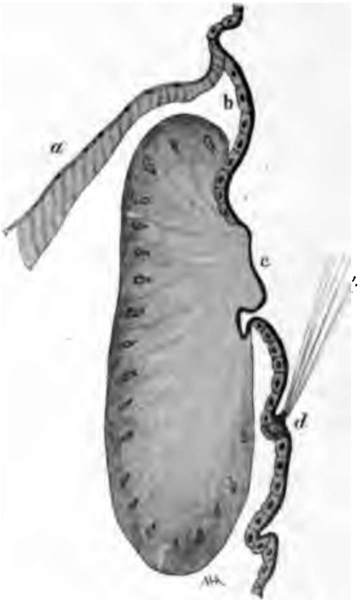

FIG. 2. Ventral section of a dermal gland ; *a*, dorso-ventral muscle ; *b*, epithelium ; *c*, mouth of the gland ; *d*, lateral fringe. Drawing by Miss Maud H. Anthony.

MALLOPHAGA FROM BIRDS OF THE HAWAIIAN ISLANDS.

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The Mallophaga (biting lice) identified and described in this paper were collected by Mr. Richard C. MacGregor from birds shot and identified by himself in the Hawaiian Islands, and constitute the first collection of insects of this order made in the islands. The collection includes twenty species of parasites taken from twelve species of birds. Of these twenty species fourteen are here named and described as new, four are named and described as varieties of previously known species, while but two can be considered typical representatives of already known species. Of the twelve bird species composing the list of hosts, four are species peculiar to the Hawaiian Islands and the parasites of these hosts are all new species except the two taken from the Hawaiian coot, *Fulica alai*.

The collection is too small and the new species in it altogether too strongly in the majority, to make profitable any attempt to compare the Mallophaga of Hawaii with those of other regions.

The occurrence of *Lipeurus docophoroides*, the typical parasite of the California partridges, on the introduced Indian "minha" is interesting, but is probably explained by the ground feeding habits of the "minha" and the introduction into Hawaii of the partridges. Interesting also and not so readily explicable is the occurrence of *Oncophorus adena* a characteristic parasite of coots and found in the Hawaiian coot, on the forest inhabiting honey-sucker, *Vestiaria coccinea*.

The following is a list of the papers by Kellogg (as sole or joint author) constantly referred to in the following pages by abbreviated titles.

New Mallophaga, I; Contributions to Biology from the Hopkins Seaside Laboratory of the Leland Stanford Junior University, No. IV, 1896.

New Mallophaga, II; Contributions to Biology from the Hopkins Seaside Laboratory of the Leland Stanford Junior University, No. VII, 1896.

New Mallophaga, III; Contributions to Biology from the Hopkins Seaside Laboratory of the Leland Stanford Junior University, No. XIX, 1899.

A List of the Biting Lice (Mallophaga) taken from Birds and Mammals of North America, Proc. U. S. Nat Mus., Vol. XXII, pp. 39–100, 1899.

Mallophaga from Birds of the Galapagos Islands, Proc. Wash. Acad. Sci., Vol. IV, pp. 457-499, 1902, pls. XXVIII-XXXI.

Mallophaga from Birds of the Pacific Coast of North America, Jour. New York Ent. Soc., Vol. X, pp. 20-28, 1902.

The nomenclature of the host birds used in this paper is that adopted by Bryan in his Key to the Birds of the Hawaiian Group (1901, Bishop Museum, Honolulu).

Docophorus communis *Nitzsch.*

GERMAR, Mag. für Ent., III, p. 290, 1818; KELLOGG, List of N. A. Mallophaga, p. 50, 1899.

From *Carpodacus mexicanus obscurus* (Pun Olai, Maui Island), and *Munia nisoria.*

Docophorus macgregori, sp. nov. (Plate XIII, Fig. 1).

Female: Body, length 1.45 mm.; width, .53 mm.; head dark chestnut brown, body uncolored with distinct triangular lateral blotches; genital blotch showing through body.

Head, length .5 mm.; width .48 mm.; triangular, forehead tapering and clypeal front narrow and slightly concave, with two short hairs on the lateral margin, one longer hair rising in front of the sutures, and one short prickle at the suture; trabeculæ prominent, nearly as long as the first two segments of the antennæ, deep chestnut-brown at the base, with uncolored tip; eye indistinct with one long hair, and near the posterior margin a second long hair; temples rounding, with four long hairs, the three in the temporal angle are pustulated, occipital margin weakly convex; ground color of head chestnut-brown, signature distinct, anterior margin deeply concave, with a slight lateral constriction near the anterior angles, lateral margins rapidly diverging, forming sharp posterior angles, the posterior margin extending backward in a long, acute angle beyond the mandibles; antennal bands interrupted at the suture, dark chestnut brown, the posterior extremities bending inward and back, meeting the dark brown occipital bands; temples an even rich chestnut-brown.

Prothorax small, lateral margins slightly diverging; lateral blotches dark chestnut-brown, separated by a broad light medium line; lateral margins blackish. Metathorax with strongly divergent lateral margins, angulated on abdomen, with distinct lateral blotches separated medially by an uncolored line, with a series of long pustulated hairs along the posterior margin. Sternal markings of dark chestnut-brown, intercoxal lines showing through the surface. Legs pale chestnut-brown, darkening slightly on anterior margins.

Abdomen ovate, widening gradually to segment 4 and rounding rapidly to segment 9, lateral angles rounding with one to three long hairs; many long, pustulated, dorsal hairs in a transverse series in the posterior margin of each segment; lateral transverse triangular blotches dark chestnut-brown, darkening slightly on the lateral margin; the posterior margin interrupted by the uncolored pustulations; median portion of the abdomen uncolored; segment 8 entirely brown; segment 9 narrowly emarginate, a few short prickles on the posterior margin; genital blotches distinctly dark brown, broadly rounding on segment 5 and rapidly tapering to sharp angle on segment 8; two distinct pustulations in the lateral angles on segment 6.

Male: Body, length 1.33 mm.; width .5 mm.; head, length .5 mm.; width .48 mm.; abdomen broadly ovate, last segment flatly rounding, with very long hair in the lateral angles; segments 6–9 entirely chestnut-brown.

Specimens from *Chlorodrepanis virens* (Kahului, Maui Island, and Ias Valley, Maui Island.)

Docophorus fuliginosus hawaiiensis, var. nov.

KELLOGG, New Mallophaga, I, 1896, p. 80, pl. III, fig. 2; List of Mallophaga, 1899, p. 47.

Measurements of male, body length 1.6 mm., width .75 mm., head length .6 mm., width .6 mm., abdomen broadly ovate to subcircular, distinctly turbinate, strongly colored, showing but little light uncolored median region, segments 1–6 with series of strong pustulations.

Many specimens from *Charadrius dominicus fulvus* (Kahului, Maui Island) and from *Heteractitis incanus* (Hito, Hawaii Island) may be referred to the species *fuliginosus* but they show well-marked varietal differences

Nirmus minhaensis, sp. nov. (Plate XIII, Fig. 2.)

Female: Body length 1.83 mm., width .46 mm., pale golden brown.

Head, length .65 mm.; width .38 mm.; narrowly elongate, conical, with the clypeal margin broadly rounding; its uncolored clypeal region expanding in front of the suture; seven hairs on the margin of forehead, two of which are longer than others and arise dorsally; antennæ with second segment longest, and segment 5 longer than segments 3 or 4; eye not prominent with one hair, temples with sides nearly parallel, one long pustulated hair in the broadly rounded temporal angle and three short prickles on the margin; occipital margin slightly concave, without hairs or prickles; general color of the head pale golden brown, clypeal signature pale brown but distinct, narrowing slightly posteriorly; anterior and posterior margins slightly convex; antennal bands broad anteriorly but little darker than general color of the head deepening to black-brown at the antennal fossæ; ocular blotch distinct, black-brown; temporal borders narrow but well marked until interrupted by the pustulation, broader just below the eye; occipital blotches distinct.

Prothorax short, sides parallel; posterior angle with one long pustulated hair; general color pale brown with whitish median line and narrow dark lateral bands. Metathorax with broad rounding sides, diverging posteriorly; one long hair in the posterior angle; posterior margin with a long, acute, median angle; lateral submarginal band, widening near the anterior angle and again in front of the posterior angle. Legs pale golden brown without dark markings.

Abdomen narrow, elliptical; broadening rapidly to segment 4; posterior angle distinct with 1–2 long hairs; broad transverse band of pale brown separated by a distinct uncolored median line extending to segment 6, bands shining in segments 6 and 7; lateral bands dark golden brown, broader anteriorly; posterior margins of segments uncolored; last segment broadly rounding with a slight emargination.

One specimen from *Acridotheres tristis* (Hahaina, Maui Island).

Nirmus stenozonus, sp. nov. (Plate XIII, Fig. 3.)

Female: Body, length 2 mm.; width .4 mm.; long, slender, pale yellow brown with distinct blackish marginal markings on the abdomen.

Head, length .4 mm.; width .36 mm.; elongate, conical with a very narrow, slightly convex anterior margin, two short marginal hairs near the front; a long weak hair in front of the trabeculæ which reach as far as the second segment of the antennæ; antennæ with second segment longest, segment 5 longer than segments 3 or 4, color pale yellow brown; eyes inconspicuous with a short prickle near the posterior margin; temporal margins flat with one long pustulated hair and a few short prickles; ground color of head yellow brown with golden brown antennal band, bending sharply in at the antennæ; anterior margins separated by an uncolored clypeus; temples bordered with narrow band of dark chestnut-brown; a pale brown shield-shaped occipital blotch surrounded by a V-shaped uncolored marking extending from the dark colored mandibles to the occipital margin.

Prothorax short with rounding lateral margins; one hair in the rounding posterior angles; pale golden brown lateral borders; metathorax trapezoidal with widely diverging sides (posterior angles extending beyond the lateral margin of the abdomen), a few short prickles and one long hair in the posterior angles, posterior margin slightly rounding on the abdomen; chestnut-brown marginal markings, paling anteriorly after the constriction; no distinct sternal markings. Legs pale yellow brown, concolorous with the body, with darker marginal markings.

Abdomen very long and slender with subparallel sides; abdominal segments gradually widening to segment 6, segment 7 slightly narrower and abruptly tapering with segment 8; two hairs in the posterior angles; segment 8 broadly rounding with slight emargination; pale yellowish-brown with blackish-brown linear bands on the lateral margins of segments 1–7; last segments without dark markings.

Two females from *Munia nisoria* and *Vestiaria coccinea* (Hilo, Hawaii Island). The specimen is much like *ductilis* but shows distinct abdominal blotches.

Nirmus diaprepes, sp. nov. (Plate XIII, Fig. 4.)

Female: Body, length 1.55 mm.; width .53 mm.; white, with dark brown to black marginal bands, brown median abdominal markings.

Head, length .46 mm.; width .4 mm.; conical, front slightly concave, with five marginal hairs placed equidistant in front of the trabeculæ, a few dorsal hairs extending beyond the margin; trabeculæ large, uncolored; antennæ uncolored, segment 2 longest, 3 and 4 about equal; segment 5 as long as both segments 3 and 4; eye inconspicuous with short prickle; temporal margins slightly rounding with one, long, weak, pustulated hair in the angle, two short prickles on lateral margin behind the eye; posterior margin straight, with two stiff bristles near the lateral angle; ground color of the head yellowish-white, clypeus uncolored, antennal bands rather broader than other body markings, black fading inwardly, distinct interruption in front of the trabeculæ; ocular blotch distinct, black, meeting the temporal bands which grow narrow at the temporal angles and disappear on the occipital margin; the mandibles chestnut-brown, a shield-shaped occipital signature chestnut-brown, darker in narrow anterior angle.

Prothorax quadrangular, with flatly rounding sides, posterior angles rounded with one hair; dark brown marginal-border; intercoxal lines of sternum showing through. Metathorax with widely diverging sides; posterior angles extending beyond the first segments of the abdomen; a series of long pustulated hairs along the broadly acute posterior margin; dark brown blotch in the anterior angles; black brown blotches in posterior angles, fading inwardly to a narrow brown band remote from the posterior margin which is pale golden brown. Legs palest golden brown, femora and tibiæ with dorsal marginal black markings with a blackish-brown annulation near the distal extremity, a few short stiff hairs.

Abdomen elongate ovate, sides subparallel; segments 1 to 4 rapidly widening; lateral angle acute with from one to three long weak hairs; narrow black brown marginal markings on segments 1 to 8; segment 8 with pale brown submarginal band passing in an elongate curve across the segment broadening on the median line; segment 9 uncolored, deeply emarginate, with one short prickle and one long hair each side of the emargination; segments 2–8 with a broad median blotch separated from the lateral border by a broad uncolored band.

Male: Body, length 1.25 mm.; width .46 mm.; head, length .38 mm.; width .38 mm.; last abdominal segment protruding, narrowly rounded with several long hairs each side of the middle of the posterior margin, segment 8 narrow, with small pale blotch near lateral margins, segments 8–9 with broad continuous median blotches; genitalia composed of narrow bars, showing through segments 6–9.

Male and female from *Vestiaria coccinea* (Hilo, Hawaii Islands).

Nirmus orarius hawaiiensis, var. nov.

KELLOGG, New Mallophaga, I, 1896, p. 104, pl. V, fig. 5; List of Mallophaga, 1899, p. 55.

Female: Body, length 1.5 mm.; width .38 mm.; head, length .25 mm.; width .26 mm. *Male:* Body, length 1.3 mm.; width .33 mm.; head, length .4 mm.; width .26 mm.; head not so elongate as in *orarius*, clypeus not extending so far laterally, color of head translucent with distinct occipital signature, abdomen with distinctly darker brown transverse bands.

Several specimens from *Charadrius dominicus fulvus* and *Fulica alai* (Kahului, Maui Island) can be referred to this species but differ in such degree as to make them entitled to varietal rank.

Nirmus gloriosus emarginatus, var. nov.

KELLOGG and KUWANA, Mallophaga from Birds of the Galapagos Ids., Proc. Wash. Acad. Sci., Vol. IV, 1902, pp. 457–499, fig. 1, pl. XXIX.

Female, body length, 1.9 mm.; width, .38 mm.; head, length, .43 mm.; width .26 mm.; male, body length 1.6 mm.; width .33 mm.; head, length .41 mm.; width .25 mm.; clypeus with distinct emargination, general color paler chestnut brown.

Several specimens from *Anous stolidus* (Kahului, Maui Island) can be referred to this species but must have a varietal name.

Lipeurus docophoroides minhaensis, var. nov.

PIAGET, Les Pediculines, 1895, p. 357, pl. XXVIII, fig. 9; KELLOGG, List of Mallophaga, 1899, p. 63.

Female, body length, 2 mm.; width 1.05 mm.; head, length .58 mm.; width .5 mm.

One female from *Acridotheres tristis* (Lahaina, Maui Island) which shows such a disproportionate width of body when compared with typical specimens of the species that it must be considered the type of a variety.

Oncophorus advena *Kellogg.*

KELLOGG, New Mallophaga, 1, 1896, p. 130, pl. XI, figs. 1–2; List of Mallophaga, 1899, p. 66.

From *Fulica alai* (Kahului, Maui Island), *Vestiaria coccinea* and *Heteractitis incanus* (Hilo, Hawaii Island). This parasite is normal on the coot (*Fulica*) but is a wholly unexpected find on the honey-creeper (*Vestiaria*).

Goniocotes chinensis, sp. nov. (Plate XIII, Fig. 5)

Female: Body, length 2.35 mm.; width .96 mm.; whole body translucent with dark golden brown marginal markings on thorax and posterior margin of head, but paling distinctly on the abdomen.

Head, length .65 mm.; width .85 mm.; front broadly rounding with several short weak hairs on margin in front of the antennæ, which are long and pale in color, the first segment longer than the second and the third and fourth subequal and together about as long as the second segment; eye flatly rounding with one short spine near the posterior angle; temporal margins sharply diverging, meeting the occipital margin in an acute angle with two long hairs and one short spine on a sharp angular projection of the temporal margin beyond the real angle of the temples.

An acute angle each side of the median angle of the occipital margin each with a short prickle; ground color of the head pale translucent yellow with a narrow band of darker yellow on the rounded front. These bands fade slightly inwardly, and in front of the antennæ turn in and darken distinctly into golden brown, fading towards the mandibles which are also dark chestnut-brown; distinct chestnut-brown blotch in front of the eye, the temples with distinct yellow marginal; bands occipital margin dark chestnut-brown, fading inwardly.

Prothorax narrow, sides slightly diverging, posterior angles not prominent with one long weak hair, dark golden brown lateral bands and the sternal markings showing through as broad golden brown bands, bending in and back and meeting in a broad sternal shield on the metathorax narrow, indistinct; a long hair in each lateral angle; dark golden brown lateral bands paling inwardly. Legs pale with slightly darker marginal band and few weak hairs; front pair very short and weak, second pair little stronger. Abdomen obovate, widening gradually to segment 4 and broadly rounding to the last segment; one to three hairs in the posterior margins growing longer on the posterior segments; last segment rounding with narrow deep median emargination; a few long and short hairs on the margin; ground color translucent pale yellow, lateral bands of darker yellow growing paler after segment 1 resembling somewhat a series of vertebræ, last segment without distinct markings.

From *Turtur chinensis* (Kahului, Maui Island).

Colpocephalum kilauensis, sp. nov. (Plate XIV, Fig. 1.)

Female: Body, length 1.55 mm.; width .5 mm.; elongate, pale golden brown with dark chestnut-brown markings on the head and thorax, and paler brown marginal border on the abdomen.

Head, length .36 mm.; width .4 mm.; front flatly rounding with a slight median angulation, palpi and antennæ barely projecting beyond the head; one short hair each side of the median line, one long stiff hair and one stiff bristle each side of the front (not like *timidum*) on the rounding anterior angle, a single stiff hair just back of a slight lateral depression and one very long and three shorter hairs and two short prickles on the lateral margin just in front of the ocular depression; eye with a slight but distinct emargination; ocular fringe distinct; temples broad with flatly convex lateral margins with a few white hairs, and three longer hairs; occipital margin broadly concave with four hairs pale golden brown with small dark brown ocular blotches and black ocular flecks; pale brown clypeal blotches; dark brown of mandibles showing through the head; temples without marginal markings.

Prothorax with a short spine and long stiff hair in the sharp lateral angles, one long hair on lateral margin; series of hairs on the narrowly rounded posterior margin; ground color darker brown than head or abdomen and sternal markings showing through. Metathorax with rounding angles, sides slightly diverging and showing a slight emargination where the mesothorax and metathorax have fused; a hair and a stiff bristle and one prickle in the posterior angle; ground color golden brown, anterior angles bordered with dark brown, lateral margins bordered narrowly with brown; this band leaves the margin and cuts off the posterior angles. Legs the paler brown of body; femora thickened and many stiff hairs.

Abdomen elongate oval; posterior angles of segments not projecting; a few short hairs on the lateral margin growing longer on the segments 6 and 8; numerous non-pustulated hairs scattered irregularly over the dorsal surface, last segment slightly convex with a series of short hairs along the posterior margin, two rather long hairs on the lateral margin and one very long hair each side of the median line; body color pale fuscous, and uncolored longitudinal line running parallel with the lateral margins on segments 1-8; outside of the line on each segment a dark fuscous blotch showing darker triangular transverse blotches on segments 1-7; last segment uncolored with pale transverse blotches fading inwardly.

Specimens from *Heteractites incanus* (Hilo, Hawaii Islands). This species resembles *timidum* closely except in size and a few minor details.

Colpocephalum epiphanes, sp. nov. (Plate XIV, Fig. 2.)

Female: Body, length 2 mm.; width .63 mm.; long and slender, dark fuscous brown.

Head, length .36 mm.; width .5 mm.; front flatly rounded; six hairs on the front; sides of front slightly diverging with seven marginal hairs, the four just in front of the ocular emargination strong and stiff; ocular emargination deep and narrow with a prominent ocular fringe; eye large with distinct emargination and black ocular fleck; antennæ projecting slightly beyond the margin of the head; temples widely projecting, narrowing rapidly posteriorly; three very long hairs, a few shorter hairs and several bristles on the rounding temporal margins; occipital margin broadly concave, bare; pale fuscous with dark brown clypeal blotches barely separated from the dark ocular blotches; temples narrowly bordered with dark brown deepening to black on the broad occipital band, fading anteriorly to meet the ocular blotches, mandibles dark, showing through the head.

Prothorax narrow, short, a spine and long hair in each obtuse lateral angle; one long hair on the lateral margin and a third long hair in the latero-posterior angles; posterior margin broadly convex; color dark fuscous with narrow lateral line of dark brown. Latero-posterior angles with dark brown blotch; two small dark triangular dorsal blotches each side of the median line (sternal markings). Metathorax bell-shaped, a few prickles on the lateral margins; posterior angle with four short spines and two long stiff hairs; color dark fuscous deepening in the posterior angles; a distinct pale suture between the meso- and metathorax with a slight lateral angular emargination and an uncolored median line across the mesothorax. Sternal marking consisting of distinct shield-shaped blotch of clear brown, the lateral angles being dark brown on the prothorax; a broad metathoracic blotch with dark intercoxal borders. Legs long, fore femora greatly thickened, some stiff hairs; concolorous with head, narrow dark marginal markings.

Abdomen elongate oval with a series of short prickles along the lateral margins of the segments; after segment 5 one or two hairs in the posterior angles of segments, these angles not extending enough to break the regular elliptical margin of the abdomen; color dark fuscous with black lateral border, broader on the first segments of abdomen, diminishing to a narrow line on the anterior half of the last segment; a pale longitudinal line running parallel with the lateral margin; each segment with a broad median transverse band separated by a pale line from the other segments; dorsal surface thickly scattered with short hairs; last segment narrowly rounding with long hairs on the lateral margin and fringe of fine short hairs along the posterior margin; a pale uncolored line on the posterior margin with large pustulations in the anterior ends of clear region.

Three females taken from *Anous stolidus*. (Kahului, Maui Island.)

Colpocephalum brachysomum, sp. nov. (Plate XIV, Fig. 3.)

Female: Body, length 1.33 mm.; width .7 mm.; short, broad, pale fulvous with dark brown to black markings on head.

Head, length .36 mm.; width .6 mm.; front flatly rounding, a short weak hair each side of the median line, a second weak hair on the lateral margin of the front; two long and two short hairs on the lateral angle in front of the ocular emargination; antennæ projecting beyond the margin by its last segment; eye large, distinctly divided, the larger anterior portion filling the angle of the ocular emargination, while the posterior portion lies apparently on a ridge which extends across the temples, a distinct black fleck in the larger portion of the eye; few stiff hairs in the ocular fringe, growing more irregular in length on the anterior portion of the prominent, rounding temples, one of these hairs very long, a few shorter hairs on the posterior margin; occipital margin weakly concave, with a long hair and short spine each side of the median line; color pale yellowish-brown; large ocular dark chestnut-brown blotches extending laterally by the black ocular fleck; dark brown clypeal blotches extending inwardly to the dark mandibles; occipital band distinct, widening into deep ruddy brown angular occipital blotches, which fade anteriorly.

Prothorax broad anteriorly, angles with one long hair and a short spine ; a short spine and one long hair on the broadly rounding lateral margin ; color yellow brown with no distinct markings. Metathorax narrow with abruptly diverging sides ; a series of short stiff spines along the lateral margin. A number of long hairs in the rounding posterior angles ; posterior margin straight with a series of long hairs ; pale brown with darker brown angular lateral blotches. Legs robust, pale brown with darker marginal bands ; a number of short stiff hairs on the outer margin of the tibia.

Abdomen broadly elliptical, the lateral margins broken by slightly projecting posterior angles of the segments; many long and short stiff hairs along the lateral margins and a series of stiff hairs along the posterior margins of each segment, the hairs longer on the posterior segments ; ground color pale yellow brown, growing paler posteriorly ; darker brown lateral bands on all segments save the last, these lateral bands interrupted interiorly by a pale line parallel with the lateral margins, last segment broadly rounded, pale yellow to uncolored posterior margin ; a few long weak hairs on the margin and a series of short weak submarginal hairs.

Specimens from *Asio accipitirinus* (Iao Valley, Maui Island), and from *Caradrius dominicus fulvus* (Kahului, Maui Island).

Colpocephalum conspicuum, sp. nov. (Plate XIV, Fig. 4).

Female: Body, length 1.28 mm.; width .55 mm. ; weakly colored, pale fuscous with conspicuous dark golden brown markings on the head, thorax and abdomen.

Head, length .25 mm.; width .4 mm. ; front with slight median angle, one short weak hair each side of the front; a slight angle in front of the palpi ; two long stiff hairs on the slight elevation in front of the ocular emargination, three stiff hairs from the ventral surface extending beyond the margin ; eye large, slightly flattened with a black ocular blotch ; ocular fringe distinct with few stiff hairs ; temples broad with flatly convex lateral margins bearing several hairs of various lengths, two being pustulated ; occipital margins broadly concave with one long hair, one short hair and one prickle each side of the median line, ground color pale fuscous with narrow dark brown ocular border, meeting the paler clypeal blotches ; mandibles dark brown ; a pale brown rectangular signature showing through the head.

Prothorax ; anterior margin broadly convex ; antero-lateral angles obtuse, a strong angle on the lateral margin with one strong hair ; three long hairs on each lateral half of the rounded posterior margin ; ground color darker fuscous than head, dark brown sternal markings showing through. Metathorax pentagonal, the mesothorax and metathorax distinctly separated ; sides of the metathorax diverging, one long hair and three spines in the posterior angle, posterior margin with a series of long hairs ; color dark fuscous on the prothorax, darker on the mesothorax dark chitinous band of coxæ showing through as a marginal border of the anterior angles ; sternal markings dark intercoxal, lines consisting of a distinct wedge-shaped marking on the prosternum pale fuscous bordered posteriorly with a narrow dark band, and an indefinite blotch on the metasternum tapering to a dark acute posterior angle. Legs concolorous with the body with small brown markings.

Abdomen elongate, elliptical, broadest on segment 5 ; posterior angles of segments slightly extending each with one long hair and a spine in the angle ; a series of irregular hairs on the posterior margin of segments, growing thinner medially ; last segment abruptly narrower than segment 8, posterior margin rounding with a fringe of fine uncolored hairs; pale fuscous with distinctly darker lateral bands darker on the posterior and inner margin; a slight suggestion of transverse bands on segments 3–6.

Male: Body, length 1.13 mm.; width, .41 mm.; darker coloring of abdomen, more dorsal and ventral hairs, segment 8 longer than segments 3–7; a distinct uncolored line in the posterior margin of segment 7; genitalia strongly chitinized, conspicuous, extending through segments 2–9; last segment rounding with two long hairs and several short hairs on the margin.

Many specimens from *Carpodacus mexicanus obscurus* (Kahului and Pau (?) Olai, Maui Island).

Colpocephalum discrepans, sp. nov. (Plate XV, Fig. 1.)

Female: Body, length 1.21 mm.; width .68 mm.; golden brown with dark chestnut ocular blotches, occipital bands and darker lateral bands on the abdomen; unusually short and rounded for a *Colpocephalum.*

Head, length .38 mm.; width .58 mm.; front flatly rounded, with a short hair each side of the median line; a few on the margin in front of the antennæ which extend beyond the head by the full length of the last segment; one very long hair and two shorter ones in front of the ocular emargination; emargination deep and acutely angular; eye large, nearly divided with a conspicuous black fleck in the larger anterior part; ocular fringe distinct and with few graduated hairs; temples gradually widening to the rounding posterior angles; many hairs of irregular length on the anterior half of the temples; two very long and a few short hairs and spines in the posterior angle; occipital margin concave with a long hair and a short spine each side of the median line; color of the head golden brown, with large ocular blotches and triangular occipital blotches of dark blackish brown connected by a band of paler brown; an even band of dark brown connects the triangular occipital blotches; a dark brown blotch each side of the clypeus in front of the antennæ connected with the dark mandibles and the ocular blotches by a pale brown blotch.

Prothorax short and strong, anterior angles with a long hair and short spine in the angle; pustulated hairs along the rounding lateral posterior margin; same golden brown color as head, transverse chitin band distinct with a short dorsal hair at the outer ends of bar; dark chitin bars extending back from the anterior margin across the prothorax. Metathorax short, appearing like the first segment of the abdomen; sides rapidly diverging; two short spines and a long hair in the posterior angles; a series of strong pustulated hairs along the straight posterior margin; median portion of the segment golden brown, the posterior angles with a broad triangular band of darker brown. Legs pale golden brown with darker blotches at the joints and a narrow marginal band of dark brown.

Abdomen broadly ovate, short hairs and spines on the lateral margins and a long hair in the posterior angle of each segment; a series of long pustulated hairs along the posterior margin of the segments; last segment broad, rounded with a few strong hairs in the margin. Color dark golden brown with darker brown lateral blotches.

Male: Body, length 1 mm.; width .1 mm.; head length .33 mm.; width .55 mm.; shorter than the female; abdomen with segments 5–7 narrowed distinctly in the middle; genitalia extending forward to segment 1 (seeming even to go into the metathorax).

A single specimen from *Carpodacus mexicanus obscurus* and from *Anous stolidus* (Kahului, Maui Island).

Menopon hawaiiensis, sp. nov. (Plate XV, Fig. 2.)

Female: Body, length 1 mm.; width .6 mm.; being thus unusually broad and short for the *Menopon* type; fuscous, translucent, with no well defined markings except the black ocular flecks and the intercoxal lines which show through the body.

Head, length .21 mm.; width .51 mm.; broad and short; a slight angulation in front, on each side of which a very short hair and one longer hair; palpi with a long terminal segment extending slightly beyond the rounding front; two long strong hairs and two shorter weaker hairs on the rounding angle in front of the ocular emargination; the emargination is slight but distinct; eye large, nearly divided by a large ocular fleck; ocular fringe with few spines; temples projecting narrowly, with four hairs on the rounding margin, two of which are very long, a few short prickles and a few shorter hairs arising on the dorsal surface; occipital margin broadly concave, a long hair on each side of the median line; color of head pale fuscous, a darker band across the front deepening where the palpi and mandibles show through the head, ocular band darkening anteriorly; occipital margin narrowly bordered with pale brown; on the under side of the head there are two strongly chitinized backward-projecting, pointed processes, arising from the labium and these show through the head given the impression of dark occipital bands.

Prothorax short, with a very long hair and two prickles in the obtuse anterior angle, a series of four long pustulated hairs and four prickles on each side of the rounding lateral and posterior margin; the transverse chitin bar distinctly pale brown, intercoxal lines showing through distinctly. Mesothorax narrow with posterior angles sharp, with a long hair and two spines in the angle, chitinous bars extending longitudinally from the anterior angles across the segment. Metathorax narrow, appearing like the first abdominal segment, a dark chitinous bar extending from the anterior lateral margin of the mesothorax back across the metathorax cutting off the posterior angles; a series of short hairs along the posterior margin; sternal markings consisting of small triangular median blotch with narrow chitinous bars arising laterally and extending forward and outward to the anterior angles of the prothorax; dark curving intercoxal bands on the mesothorax; legs translucent, fuscous with distinct brown margins.

Abdomen broadly ovate, posterior angles obtuse and slightly projecting with a short spine and from one to two long hairs in the angle; a series of hairs along the posterior margin of each segment; entire abdomen a darker fuscous than the head or thorax, a narrow transverse band of darker brown across each segment; last segment broadly rounded with a series of hairs along the posterior margin.

One female from *Chlorodrepanis virens* (Iao Valley, Maui Island).

Menopon cyrtostigmum, sp. nov. (Plate XV, Fig. 3.)

Male: Body, length 1 mm.; width .46 mm.; short, broad; golden brown darker on abdomen, black brown ocular bands with many stiff spines on body.

Head, length .26 mm.; width .4 mm.; front broadly and evenly rounding with two short hairs near the median line, a weak hair in front of the slightly projecting palpi; one short hair at the suture; two long and one shorter pustulated hairs in front of the distinct ocular emargination; eye inconspicuous but with a distinct black fleck; ocular fringe distinct, composed of stiff curving hairs which extend slightly on the temporal margin; temples rounding, narrowing posteriorly with five long pustulated hairs and two short spines on the margin; occipital margin broadly concave with one short hair near the outer angle; color of the head pale fuscous with narrow dark chestnut-brown ocular blotches and black ocular flecks: dark markings on front of head showing through from palpi and mandibles; occipital margin with narrow band of dark chestnut-brown, darkening slightly at the occipital blotches.

Prothorax short, anterior angles projecting but little with a long hair and two short prickles in each; a series of six hairs on the broadly rounding posterior margin; color darker brown than the head, wedge-shaped blotch and dark intercoxal bars showing through distinctly from the sternum. Mesothorax distinctly separate from the metathorax by a series of short spines. Metathorax long, little broader than the prothorax; side slightly divergent with one short spine on the lateral margin; three short spines and one long hair in each posterior angle; a series of weak hairs on the posterior margin; color chestnut-brown, lighter than the prothorax, darker in the anterior angles and a narrow band along the lateral margins, legs robust, of the palest fuscous color of the head, with darker band and semi-annular rings; many short stiff hairs on the front of the femora and tibia.

Abdomen broadly elliptical; small as compared with the large head and thorax; a few short stiff spines in the posterior angle of the segments with a long hair in angles of segments 2–8. A series of long stiff hairs on the posterior margin of each segment; each segment with a pale transverse band, darkening on the posterior margin and the lateral margin interrupted by a narrow uncolored submarginal band parallel with the lateral margins of the abdomen; last segment broadly rounding, without dark markings, with two long hairs and a short spine on the lateral margin; genitalia dark brown, extending forward into segment 5 and showing through the body distinctly.

Female: Body, length 1.16 mm.; width .26 mm.; head, length .33 mm.; width .38 mm.; much paler in color than male, only showing dark markings on the head.

Specimens from *Vestiarea coccinea*, *Himatione sanguinea* (Hilo, Hawaii Islands) and *Chlorodrepanis virens* (Iao Valley, Maui Island).

Menopon hilensis, sp. nov. (Plate XV, Fig. 4.)

Female: Body, length .91 mm.; width .48 mm.; short broad, pale fuscous without well-defined markings.

Head, length .21 mm.; width .4 mm.; front broadly rounding with two short hairs each side of the front; one very long and one shorter hair in front of the ocular emargination; ocular emargination distinct but shallow; eye large quite filling the angle, distinctly cleft with a large ocular fleck and two stiff prickles, protruding with one very long hair and two shorter hairs, several spines and prickles on the rounding margin; one long and two short spines on the dorsal surface each side of occipital margin, which is slightly concave with a spine and one long hair each end side of the median line; a second long hair on the outer angle of the occipital margin and the temple; color of head pale fuscous, narrow dark band on the front broadening into a blotch each side of the clypeus; with dark black-brown ocular bands, and narrow triangular occipital blotches meeting in the median line and extending along the posterior margin of the temples.

Prothorax wide, anterior angles round with a short spine; six long pustulated hairs and a spine on the rounding lateral posterior margin; a dorsal prickle at each end of the distinct transverse chitin bar; color fuscous. Metathorax with slightly diverging sides with three strong marginal spines, two long hairs and prickles in the posterior angles; a series of weak hairs and one spine along the posterior margin; color dull fuscous. Legs concolorous with the body, with darker marginal markings.

Abdomen broadly ovate, with a long hair, a shorter hair and a prickle in the posterior angle of the segments; a series of weak hairs along the posterior margin; last segment narrow, with a series of hairs on the posterior margin which has a slight median angulation; color fuscous, slightly darker on the posterior margin of the segment, a pale band on the posterior margin of segment 6, segment 7 deeper fuscous than other segments.

One specimen from *Vestiaria coccinea* (Hilo, Hawaii Islands).

Menopon invadens, sp. nov. (Plate XV, Fig. 5.)

Female: Body, length 1.75 mm.; width .66 mm.; pale, clear, yellowish-brown, slightly darker thorax, indistinct lateral bands on the abdomen.

Head, length .35 mm.; width .53 mm.; front flatly convex, with two short stiff hairs at the median line; one long and one shorter marginal hairs on the angle in front of the antennæ; two long and two shorter hairs on the distinct swelling in front of the ocular emargination; eye large, distinctly emarginate with a large black ocular fleck; a long stiff hair on the dorsal surface near the margin; ocular fringe distinct, composed of a few stiff curving hairs; temples rounding narrowly but without angles; three very long pustulated hairs, two shorter hairs and a few short prickles on the margin; two long pustulated hairs on the occipital margin; ground color clear yellowish-brown with darker brown blotches at base of the antennæ; dark brown mandibles shining through the head; a narrow dark brown ocular band, widening anteriorly, and a narrow occipital band of dark brown.

Prothorax short; anterior angles with two spines and one long hair; posterior margin broadly rounding with two long hairs near the lateral margin and two long hairs each side of the median line; whole segment darker brown than the head, with a distinct transverse chitin bar. Metathorax and mesothorax long, being separated by a distinct suture, mesothorax distinctly darker brown than the metathorax, lateral margins diverging with few short spines and one long hair in its posterior angles; posterior margin straight with four long marginal hairs; dark intercoxal chitin bar showing through. Legs large, weakly colored, translucent dorsal marginal bands on femora and tibiæ; anterior coxæ with bluntly triangular black blotches; many short spines and a few long hairs.

Abdomen elongate, elliptical; a series of short stiff spines and one to two long weak hairs in the lateral angles and a series of long hairs on the posterior margins of each segment; segments 7 and 8 with two long hairs in the posterior angles; last segment with two long hairs each side of the posterior margin, ground color pale, clear yellowish-brown; indistinct lateral band growing darker from segment 2 to segment 7; narrow, pale brown transverse bands; many scattered hairs on the ventral surface and groups of strong spines, besides the series of stiff spines near the lateral angles.

Specimens from *Acridotheres tristis* (Lahaina, Maui Island and Kahului, Maui, Island), and *Turtur chinensis* (Kahului, Maui Island).

LIST OF HOSTS, WITH PARASITES.

ANOUS STOLIDUS.
Nirmus gloriosus emarginatus KELLOGG & CHAPMAN.
Colpocephalum epiphanes KELLOGG & CHAPMAN.
Colpocephalum discrepans KELLOGG & CHAPMAN.

FULICA ALAI.
Nirmus orarius hawaiiensis KELLOGG & CHAPMAN.
Oncophorus advena KELLOGG.

HETERACTITIS INCANUS.
Docophorus fuliginosus hawaiiensis KELLOGG & CHAPMAN.
Oncophorus advena KELLOGG.
Colpocephalum kilauensis KELLOGG & CHAPMAN.

CHARADRIUS DOMINICUS FULVUS.
Docophorus fuliginosus hawaiiensis KELLOGG & CHAPMAN.
Nirmus orarius hawaiiensis KELLOGG & CHAPMAN.
Colpocephalum brachysomum KELLOGG & CHAPMAN.

TURTUR CHINENSIS.
Goniocotes chinensis KELLOGG & CHAPMAN.
Menopon invadens KELLOGG & CHAPMAN.

ASIO ACCIPITIRINUS.
Colpocephalum brachysomum KELLOGG & CHAPMAN.

ACRIDOTHERES TRISTIS.
Nirmus minhaensis KELLOGG & CHAPMAN.
Lipeurus docophoroides minhaensis KELLOGG & CHAPMAN.
Menopon invadens KELLOGG & CHAPMAN.

CARPODACUS MEXICANUS OBSCURUS.
Docophorus communis NITZSCH.
Colpocephalum discrepans KELLOGG & CHAPMAN.
Colpocephalum conspicuum KELLOGG & CHAPMAN.

MUNIA NISORIA.
Docophorus communis NITZSCH.
Nirmus stenozonus KELLOGG & CHAPMAN.

VESTIARIA COCCINEA.
Nirmus stenozonus KELLOGG & CHAPMAN.
Nirmus diaprepes KELLOGG & CHAPMAN.
Oncophorus advena KELLOGG.
Menopon cyrtostigmum KELLOGG & CHAPMAN.
Menopon hilensis KELLOGG & CHAPMAN.

HIMATIONE SANGUINEA.
Menopon cyrtostigmum KELLOGG & CHAPMAN.

CHLORODREPANIS VIRENS.
Docophorus macgregori KELLOGG & CHAPMAN.
Menopon cyrtostigmum KELLOGG & CHAPMAN.
Menopon hawaiiensis KELLOGG & CHAPMAN.

EXPLANATION OF PLATE XIII.

Fig. 1. *Docophorus macgregori* KELLOGG & CHAPMAN, female.
Fig. 2. *Nirmus minhaensis* KELLOGG & CHAPMAN, female.
Fig. 3. *Nirmus stenozonus* KELLOGG & CHAPMAN, female.
Fig. 4. *Nirmus diaprepes* KELLOGG & CHAPMAN, male.
Fig. 5. *Goniocotes chinensis* KELLOGG & CHAPMAN, female.

EXPLANATION OF PLATE XIV.

Fig. 1. *Colpocephalum kilauensis* KELLOGG & CHAPMAN, female.
Fig. 2. *Colpocephalum epiphanes* KELLOGG & CHAPMAN, female.
Fig. 3. *Colpocephalum brachysomum* KELLOGG & CHAPMAN, female.
Fig. 4. *Colpocephalum conspicuum* KELLOGG & CHAPMAN, male.

EXPLANATION OF PLATE XV.

Fig. 1. *Colpocephalum discrepans* KELLOGG & CHAPMAN, female.
Fig. 2. *Menopon hawaiiensis* KELLOGG and CHAPMAN, female.
Fig. 3. *Menopon cyrtostigmum* KELLOGG & CHAPMAN, male.
Fig. 4. *Menopon hilensis* KELLOGG & CHAPMAN, female.
Fig. 5. *Menopon invadens* KELLOGG & CHAPMAN, female.

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NOTE ON A NOCTUID LARVA.

BY D. W. COQUILLETT.

Cosmia punctirena *Smith.*

Body green, a whitish dorsal, subdorsal and less distinct infrastigmatal line; piliferous spots and spiracles white, the latter ringed with black; venter and legs green; head yellowish-green; length 27 mm.

Found April 7, 1892, near Santa Barbara, Cal., between two or more leaves fastened together with silken threads on *Populus trichocarpa.* Pupated April 15 and the moth issued May 12.

PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING OF FEBRUARY 4, 1902.

Held at the American Museum of Natural History. President C. F. Groth in the chair with nine members and two visitors in attendance.

The minutes of the two previous meetings were read and approved.

Mr. Schaeffer in behalf of the committee presented the following resolutions on the death of our member Mr. Ottomar Dietz:

"WHEREAS the New York Entomological Society has learned with deep sorrow of the sudden death of its member, Mr. Ottomar Dietz, therefore be it

"*Resolved* that by his untimely and sudden departure this society records with the deepest regret the loss of one of its most enthusiastic and estimable members.

"*Resolved* that we sincerely mourn for the bright and genial companion and we wish to express our earnest tribute to a man who possessed the most honorable qualities of manhood.

"*Resolved* that the members of this society tender to the family of its late member their expression of sympathy in their grief, and express the hope that the inspiring memorial of his many virtues will afford consolation for their loss.

"*Resolved* that these resolutions be entered on our minutes, published in the Journal of the Society and the secretary be instructed to forward a copy of these resolutions to the family of the deceased."

Upon motion the resolutions were adopted.

Mr. Roy S. Richardson was elected an active member of the society.

Mr. Joutel exhibited specimens of all the described species and varieties of *Saperdas*, including *Saperda hornii* described in the February number of the Entomological News, and gave an account of the food-habits of all the described species. He also had some striking varieties of *Saperda lateralis* and mentioned the fact that they were in many collections confounded with *Saperda tridentata*. He stated that Dr. E. P. Felt and himself were working up the genus and had one and perhaps two new species to describe. The paper will be illustrated with six or more colored plates.

Mr. Schaeffer exhibited a species of *Cassida* taken in Suffern, N. J., by Dr. Love, and which he thinks will prove to be new. He said that it was very distinct from any of our species and only comparable with the European *Cassida nebulosa* which it resembles very much, but from which it differs in being smaller, entirely smooth thorax with only a few shallow punctures at base and having the seventh and eighth joint of the antennæ comparatively shorter. He further remarked that he has not seen *Cassida thoracica*, but the description of that species as given by Crotch does not agree with the insect, and he hopes to get a few specimens of *C. thoracica* to settle the matter finally.

Dr. Love exhibited a specimen of *Dicalus splendens* captured in Texas, showing a very much deformed posterior tarsus. Also a box containing an interesting lot of Mutillidæ, consisting of twelve species, recently received from Dr. Kunze in Arizona.

Mr. Beutenmüller exhibited a box of Lepidoptera recently received from Mr. Polling. Among the material was a type specimen of *Megathymus ursus* from Arizona.

MEETING OF FEBRUARY 18, 1902.

Held at the residence of Mr. Herman Hug, 319 Hudson St., Hoboken, N. J. President C. F. Groth presiding, with eight members present.

In the absence of the Secretary, Mr. Weeks was appointed Secretary *pro tem.*

On motion the reading of the minutes of the last meeting was dispensed with.

Mr. Beutenmüller, of the Auditing Committee, reported progress.

Dr. Lagai, through Mr. Schaeffer, proposed as an active member Mr. E. R. Pearlle Janvin, also Mr. Charles H. Sunderland, of Rutherford, N. J.

Mr. Beutenmüller proposed as members Mr. Herman Erb, of 322 E. 13th St., and Mr. Erich Lehsten, of 161 Washington St.

Mr. Barber, through Mr. Joutel, proposed the name of Prof. W. G. Johnson.

The death, on the 15th inst., of Mr. John Akhurst, of 78 Ashland Place, Brooklyn, a member of the Brooklyn Entomological Society, of the Brooklyn Institute of Arts and Sciences, the Smithsonian Institution and the Long Island Historical Society, and well known as an entomologist and taxidermist, having been announced, and due tribute to his knowledge and skill as a taxidermist and entomologist, as well as to his many kindly qualities of mind and heart having been given, the Secretary was directed to place upon the records of the society a minute of sincere regret of the members at his departure, as a token of their respect and consideration for his memory.

Mr. Beutenmüller having suggested the propriety of again holding an annual dinner, on motion of Dr. Love, Messrs. Palm and Beutenmüller were appointed a committee to confer as to the same and report thereon as speedily as convenient. On motion the meeting adjourned to inspect the excellent collection of Lepidoptera of Mr. Hug, among which was a fine specimen of *Pieris virginiensis* taken by himself on May 9, 1896, in Sullivan Co., N. Y.

MEETING OF MARCH 4, 1902.

A regular meeting was held at the American Museum of Natural History. President C. F. Groth in the chair, fifteen members and one corresponding member present.

Mr. Watson, of the Field Committee, reported on a plan for the coming season and recommended that the outing program of last season be followed this year. On motion of Mr. Palm, Mr. Watson's recommendation was adopted.

On account of business pressure Mr. Watson resigned from the Field Committee. The resignation was accepted with regret.

The following active members proposed at the last regular meeting were elected: Mr. Herman Erb, Mr. E. R. Janvrin, Prof. W. G. Johnson, Mr. Erich Lehsten, and Mr. Charles H. Sunderland.

On motion of Mr. Barber the society extended a vote of thanks to Mr. Hug for the kindness of his hospitality on the evening of February 18.

On motion of Mr. Joutel the society voted to extend appreciative recognition to Mr. W. Knaus for his donation of insects for the auction sale of the society.

Dr. Van Dyke was then called upon for a talk. His subject was "Notes upon the Buprestidæ of California." He first mentioned the fact that all of the species of this family found within the limits of the State might easily be placed in one of two great groups; the first, to include those which were northern in origin and are dependent upon coniferous and deciduous trees, which for the most part are to be found only in the mountainous regions; and those which acknowledge the Sonoran regions as their home and are in consequence almost entirely confined to those sections where the fauna derived from this region is most in evidence. To the first belong such genera as *Chalcophora, Dicerca, Trachykele, Poecilonota, Buprestis, Melanophila, Anthaxia,* about half of the *Chrysobothris, Chrysophana* and part of *Agrilus.* To the second belong such genera as *Gyascutus, Hippomelas,* half of *Chrysobothris, Actenodes, Glyptoscelimorpha, Dystaxia, Schizopus, Polycesta, Acmæodera, Ptosima* and part of *Agrilus.*

He then took up the family, going over it genera by genera and giving comments and field experiences as he went along. Among other things he mentioned his belief that *Buprestis consularis, nuttalli, læviventris, subornata* and *rusticorum* were all varieties of one species, and that the variety of *Buprestis gibbsii* with confluent marking was not only more common than the true form, but was more southern in distribution, probably had different food-habits and was in several other ways quite distinct from the other. As showing how numerous certain species were at certain times and places, he cited some of his collecting experiences. One June, while in Shasta Co., he collected great numbers of *Dicerca hornii, Pæcilonota ferrea* and *Buprestis fasciata,* and its variety *langii,* simply by getting out early in the morning while the air was still crisp. The first two species he picked off of young alder trunks, the others off of the bright green poplar leaves. On another June vacation he took in Mendocino Co., within three days' time, many hundreds of *Melanophila drummondi* and its immaculate variety, simply by picking them off of the tents whither they had been attracted by the glare and some few boughs. They were scarce both before and after this period. On a fallen spruce trunk, on the sides of Mt. Wilson, in southern California, he took in a half hour's time about thirty specimens of *Dicerca californica* and about a dozen *Melanophila drummondi,* both rare in that section; and on the same day, by sweeping the flowers and the sides of the brush along the trail, he took eight species and a good deal over a hundred specimens of *Acmæodera,* within an hour's time. On another occasion, the 3d of July, while out collecting at Banning with Mr. Coquillett, there were taken one specimen of *Hippomelas californicus*, a number of specimens of *Gyascutus obliteratus*, forty or fifty *Acmaeodera gibbula*, one or two *Chrysobothris mali*, many *Chrysobothris debilis*, and several hundred *Chrysobothris merkeli*, the first on the wing, the second in flowers of mesquite and all of the rest by beating dead trees of the latter.

The doctor then gave a list of all the species found in the state of California.

The next paper was by Mr. J. R. de la Torre Bueno, "Notes on a Mole-cricket from Porto Rico." He exhibited epecimens of the mole crickets sent to him by a correspondent in Porto Rico, who wrote as follows: "There is hereabout a worm whose technical name I do not know, called popularly 'changa.' It is a kind of winged and jumping cricket. As a general rule it lives below the surface and comes up only at times of great drouths. It feeds on the roots of plants, among them the sugar cane. But the unfortunate part is that the cane whose roots have been attacked by the insect loses its beautiful green and becomes a pale yellow. It also loses its sap to such a degree that it is given up, as it yields no juice when crushed. The cane is then said to be sick. This insect was unknown here twenty-five or thirty years ago, and it made its first appearance on lands fertilized with guano from Peru and it shortly took possession of such lands as had not been fertilized with guano. In the dry season the country people had the habit of making fires to burn the grass, and to these the crickets come by thousands."

Mr. Bueno sent some of his specimens to Dr. Howard and they were identified by Mr. Caudell as *Scapteriscus didactylus*. Mr. Caudell gave it as his opinion that they originated in Cuba.

Mr. Bueno said that he was inclined to believe that Mr. Caudell was right in ascribing its home as Cuba, as the Chincha Islands, from which Peruvian guano originally came, are barren rocks in the ocean, covered with the excreta of birds and absolutely devoid of vegetation. And as this insect is naturally a vegetable feeder it seems reasonable to suppose that it did not originate there. Moreover, the insect is popularly known in Porto Rico as "Cubano" or Cuban.

Discussed by Mr. Davis, who also exhibited a specimen from Porto Rico.

Mr. Zabriskie then spoke on "Some Species of Native Ear-wigs and Eggs of the American Katydid (*Microcentrum laurifolium*)." He showed a collection of three of our species and made a few remarks on the habits and habitat of the forms shown. Most of them were collected on Sheffield Island, off the shore of Connecticut. Mr. Zabriskie stated that he believed ear-wigs were much commoner in the South and on the Pacific Coast than in the Eastern United States, where there were but some seven or eight species.

Dr. Van Dyke, in discussing the paper, said that he had not found ear-wigs at all common in California, with the possible exception of a single species which was common in southern California.

Mr. Joutel stated that he had found one large ear-wig, *A. maritima*, very common along the East River, under rubbish.*

---

* Also found along the Hudson River. W. B.

Mr. Schaeffer said that, on one occasion, he had found *Labia minor* very common at Mosholu.

Mr. Zabriskie also showed some specimens of the katydid (*Microcentrum laurifolium*) with egg clusters of the species and explained the manner in which they were deposited. He also stated that some twenty-five years ago the real katydid (*Cyrtophyllus concavus*) was very common in his neighborhood, but in recent years he had not seen or heard a single one.

Mr. Davis showed some immature walking-sticks which he had reared from eggs collected in Ansonia, Conn. The antics of the tiny animals as they tried to walk was an interesting sight.

Society adjourned.

MEETING OF MARCH 18, 1902.

Held at the residence of Mr. Gustave Beyer, 511 East 117th St. President Groth presided, eleven members and two visitors present.

Mr. Charles W. Leng, of 4 Fletcher St., N. Y., was proposed as an active member by Mr. Davis.

Mr. Beutenmüller, chairman of the Committee on the Annual Dinner, reported and considerable discussion followed.

Dr. Love moved that a canvass of the members present be taken, and if fifteen should indicate their desire to take tickets at $1 a plate, the committee should arrange for the dinner before April 15. Carried.

A canvass resulting in the desired number, the committee were authorized to proceed with the arrangements.

Dr. Love moved that the committee be empowered to invite five guests at the expense of the society. Carried.

Mr. Joutel moved that, if the committee could make the necessary arrangements in time, the dinner should occur on April 1, the date of the next regular society meeting. Carried.

Society adjourned.

ANNUAL DINNER, APRIL 1, 1902.

The society held its regular annual dinner at the Hotel Endicott, corner of 82d St. and Columbus Ave. The following guests and members were present: as guests Dr. Edwin C. Van Dyke, Dr. Henry Skinner, Dr. W. J. Holland, Dr. E. P. Felt, Professor John B. Smith, Mr. E. B. Southwick, Mr. Ernest J. Munch, Mr. Chris. H. Roberts, Mr. J. D. Sherman, Mr E. L. Graef and G. Englehardt, and members Messrs. Groth, Kearfott, Palm, Fillion, Riederer, Davis, Ditmars, Watson, Bremser, Kudlich, Leng, Joutel, Barber, Schaeffer, Beyer, Love, Sunderland, Green, Johnson, Weeks, Ottolengui and Beutenmüller.

MEETING OF APRIL 15, 1902.

Held at the American Museum of Natural History. President Groth in the chair with fourteen members and one visitor present.

A written report by Mr. Beutenmüller, of the Dinner Committee, was read and approved.

Mr. Chas. W. Leng was elected an active member of the society.

Mr. Joutel proposed Mr. E. B. Southwick, of 206 W. 83d St., as an active member. Mr. Leng proposed as active members Mr. C. H. Roberts, of 74 West 119th St., and Mr. John D. Sherman, of 148 East 18th St. Mr. Beutenmüller proposed the name of Mr. E. L. Graef, of 58 Court St., Brooklyn, as an active member of the society.

In view of the resignation of Messrs. Watson and Comstock from the field committee, the president appointed Mr. Davis and Mr. Joutel to act in that capacity.

Mr. Seifert spoke on the subject of "The Larvæ of *Heliothis rhexia* and *Lygranthœcia rivulosa.*" He stated that *Ambrosia artemesiæfolia* is a very common weed near New York city; according to the nature of the soil, the branches and leaves of the plant are subject to much variation in color. This latter may be said also of the more southern *Linaria canadensis. Ambrosia artemisiæfolia* is the food-plant of *Lygranthœcia rivulosa.* The larva feeds only on the sterile flowers of the long racemes from August to about the middle of September. The head of the larva is rather prominent, mandibles well developed, thoracic segments wider than the head, abdominal ones tapering slowly toward the anal end. The larva is not smooth, tubercles black, conspicuous; setæ weak; it adapts itself to all the color shades of the racemes, from purplish to brown and different shades of green. The caterpillar, when resting, often assumes a sphingid-larva-like attitude and singularly most obvious with the green varieties. They have short, oblique, lateral stripes running from anterior to posterior. The larvæ prefer sandy soil, burying themselves rather deep into the ground, forming a cell to pupate in. The moth appears in July and August.

The larvæ of *Heliothis rhexia* were found in numbers during April and May at Island Grove, Florida, feeding on the unripe capsules and the buds of *Linaria canadensis.* Females were found depositing eggs at the end of March and beginning of April, the imagoes being already on the wing the latter part of May and beginning of June. The larvæ also adapt themselves in regard to color to the slender, variable flowering stems; the sterile shoots being procumbent. The variability of the larva extends from green and brown shades to almost scarlet.

With some of the varieties of both species it is very difficult to distinguish the larvæ of both, even the heads of the larvæ varying in color with each species.

The larvæ of both these species are day feeders, the *L. rivulosa* larvæ being much subject to the attacks of dipterous parasites while the larvæ of *H. rhexia* are a coveted prey for a large blue-winged Hymenopteron and fierce Hemiptera, which are fairly swarming within the pinkish fields of *Linaria canadensis.*

Mr. Schaeffer spoke on "A Collection of Coleoptera made Last Year in Brownsville, Texas, by the late Ottomar Dietz." He said, although Mr. Dietz did not consider the material quantitatively or qualitatively as good as he expected, there are among the material quite a number of interesting species, some of which are entirely new to science, while others are described as only likely from that locality and others described from Mexico, but new to our list.

A small box of the more interesting forms was exhibited by him, amongst which were *Micraga ænea, Lebia bitæniata, Cregya* probably sp. nov., *Catyphus*, sp. nov.?, *Tyndaris*, sp. nov., *Rhæboscelis*, sp. nov., *Mastogenius*, sp. nov., *Drapetes niger*, described by Dr. Horn in Biol. Cent. Amer., *Trichodesma*, sp. nov.? *Trox*, sp. nov., *Eburia stigmatica, Tylosis oculata, Tetranodes*, sp., *Ibidion townsendi, Ibidion exclamationis, Priocera serraticollis, Ecyrus fasciatus, Diabratica peregrina, Polypria crux-rufa*, etc.

Mr. Leng showed a new color variety of *Cicindela sexguttata* which he said seemed to occur only at high altitudes.

Mr. O'Connor exhibited a number of moths and beetles which he had collected while on a short visit to Cuba recently.

Adjournment.

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NEW ACALYPTRATE DIPTERA FROM NORTH AMERICA.

By D. W. Coquillett.

Family Micropezidæ.

Micropeza bisetosa, sp. nov.

Black, the lower side of the third antennal joint, upper part of the face, the cheeks, mouth parts, lower part of occiput, posterior margin of each abdominal segment, greater part of male hypopygium, stems of halteres, coxæ and bases of femora, yellow; mesonotum gray pruinose, marked with four brownish vittæ, two posthumeral bristles each side; wings hyaline, unmarked. Length, 5 mm.

Habitat. — Prescott, Arizona (June 6), and Las Vegas Hot Springs, New Mexico (August 9).

A specimen of each sex collected by Mr. H. S. Barber. Type No. 6626, U. S. N. M.

Family Sapromyzidæ.

Sapromyza glauca, sp. nov.

Black, the antennæ, a transverse streak above them, the palpi, halteres, abdomen except the first segment and spot on each side of the others, the bases and a broad ring at middle of tibiæ, and broad bases of the middle and hind tarsi, yellow; head, thorax and scutellum bluish-gray pruinose, a black spot on each side of antennæ, third joint of antennæ less than twice as long as wide, arista rather long-plumose, face slightly concave; four pairs of dorsocentral bristles, the bristly hairs between them arranged in four rows, two sternopleural bristles; wings tinged with yellow. Length, 3 mm.

Habitat.—Marlboro, Maryland.

A single specimen, collected May 13, by Mr. H. S. Barber. Type No. 6627, U. S. N. M.

Sapromyza vittigera, sp. nov.

Black, the narrow base of the third antennal joint, mouth parts, halteres, venter, bases and a median ring on tibiæ, and bases of tarsi, yellow, dorsum of abdomen dark brown and somewhat polished ; head gray pruinose, front with a median brown vitta, face strongly concave, a small round brown spot on each side of the center, third joint of antennæ only slightly longer than wide, arista pubescent, thorax and scutellum gray pruinose, mesonotum marked with three brown vittæ, three pairs of dorsocentral bristles, the anterior pair located in front of the transverse furrow, the bristly hairs between the dorsocentral rows arranged in two rows, two sternopleural bristles ; wings hyaline. Length, 2.5 mm.

Habitat.—Georgia.

Two specimens collected by H. K. Morrison. Type No. 6628, U. S. N. M.

Sapromyza puncticeps, sp. nov.

Yellow, a small, rounded, velvet-black spot at middle of lower edge of face, and a small black ocellar spot ; face slightly concave, third joint of antennæ slightly longer than wide, arista black, pubescent ; mesonotum somewhat opaque, thinly gray pruinose, three pairs of dorsocentral bristles, all of them postsutural, the bristly hairs between the two rows arranged in four rows, two sternopleural bristles ; wings hyaline. Length, 2.5 mm.

Habitat.—Mt. Washington, New Hampshire.

Three specimens collected by Mrs. Annie T. Slosson. Type No. 6629, U. S. N. M.

Lauxania variceps, sp. nov.

Black, the lower part of the front and four vittæ extending from it nearly to the vertex, a streak extending from each antenna to lower hind corner of the corresponding cheek, the bases of the antennæ, the halteres, knees and middle and hind tarsi, yellow ; head polished, center of face gibbous, third antennal joint less than twice as long as wide, arista bare, body polished, mesonotum somewhat opaque, thinly gray pruinose, four pairs of dorsocentral bristles, the anterior pair sometimes small, located in front of the suture, the hairs between them not in rows, two sternopleural bristles ; wings hyaline. Length, 2.5 to 3 mm.

Habitat.—Williams, Arizona.

Six specimens collected June 7 and 8 by Mr. H. S. Barber. Type No. 6630, U. S. N. M.

Lauxania longicornis, sp. nov.

Black, the lower edge of the front above the antennæ, extending as four vittæ to the vertex, an oblique streak on each side of the face, bases of antennæ, the palpi, halteres, apices of femora, the tibiæ and tarsi except apices of front tarsi from four fifths length of first joint, yellow, front tibiæ partly brownish-yellow ; head polished, third joint of antennæ slender, over three times as long as greatest width, almost reaching the mouth, arista bare, face gibbous; body polished, three pairs of dorsocentral bristles, all of them postsutural, the hairs between them not in rows, two sternopleural bristles; wings hyaline. Length, 2.5 to 3.3 mm.

Habitat.—Williams (June 7, H. S. Barber), and Oracle (June 30, Hubbard and Schwarz), Arizona; and Mesilla Park, New Mexico (April 28, T. D. A. Cockerell).

Four specimens. Type No. 6631, U. S. N. M.

Lauxania nigrimana, sp. nov.

Black, lower edge of front above antennæ, upper edge of face below antennæ, prolonged obliquely to lower front corner of cheeks, posterior half of cheeks, bases of antennæ, the halteres and legs except apices of front femora and whole of their tibiæ and tarsi, yellow, antennal arista white, pubescent; head polished, a large spot below ocelli and the yellow portion of face and cheeks whitish pruinose; face gibbous, third joint of antennæ slender, over four times as long as its greatest width; body polished, the mesonotum and scutellum except the sides of the former opaque, gray pruinose, sternum whitish pruinose, three pairs of dorsocentral bristles, all of them postsutural, the bristly hairs between the two rows arranged in four rows, two sternopleural bristles; wings yellowish hyaline. Length, 4 mm.

Habitat.—Williams, Arizona.

Two specimens collected July 23 and 26 by Mr. H. S. Barber. Type No. 6632, U. S. N. M.

Lauxania cineracea, sp. nov.

Black, the base and under side of the antennæ, the halteres and bases of middle and hind tibiæ and of their tarsi yellow; head opaque, grayish pruinose, middle of front marked with a pair of blackish vittæ, center of face only slightly swollen, third joint of antennæ slightly over twice as long as wide, arista rather long-plumose; thorax opaque, gray pruinose, lateral margins of mesonotum brownish, the bristles and hairs situated on brown dots, only two pairs of dorsocentral bristles, the bristly hairs between them arranged in four rows, one sternopleural bristle, upper side of scutellum opaque, gray pruinose, the lower side somewhat polished, abdomen polished and having a brassy tinge; wings yellowish hyaline. Length, 3.5 mm.

Habitat.—Biscayne Bay, Florida.

A single specimen collected by Mrs. Annie T. Slosson. Type No. 6633, U. S. N. M.

Lauxania lutea, sp. nov.

Reddish-yellow, the legs and abdomen light yellow, the latter with a rounded black spot in middle of base of segments three to six; head polished, face rather strongly convex, front noticeably wider than either eye, ocellar bristles obsolete, third joint of antennæ nearly twice as long as broad, arista brown, rather long-plumose; thorax highly polished, two pairs of dorsocentral bristles, the hairs between them not arranged in rows, two sternopleural bristles; wings strongly tinged with yellow, penultimate section of fourth vein scarcely more than half as long as the last section. Length, 3.5 mm.

Habitat.—Lake Worth and Biscayne Bay, Florida.

Two specimens collected by Mrs. Annie T. Slosson. Type No. 6634, U. S. N. M.

Family TRYPETIDÆ.

Trypeta varipennis, sp. nov.

Yellow, a pair of black spots on upper edge of metanotum, a black spot in front of each haltere, a transverse row of four round black spots on the first four abdominal segments, a pair of spots at base and the narrow apex of the ovipositor, black; head and mesonotum subopaque, the posterior part of the latter, the scutellum, metanotum, pleura and abdomen highly polished; bristles black, hairs of abdomen also black; third antennal joint tapering towards the apex, which is rounded; one pair of dorsocentral and one of acrostichal bristles, scutellum bearing four bristles; ovipositor as long as the penultimate abdominal segment; wings hyaline, costal margin to tip of fourth vein bright yellow, changing into brown at apex of wing and marked with three rounded brown spots, one at humeral crossvein, another at apex of auxiliary vein, the third just beyond apex of first vein; anal cell yellow, a large brown cloud at its apex; a yellow crossband begins at the costal margin just beyond apex of first vein, and passes over small crossvein and reaches the fifth vein below which it changes to brown and extends nearly to the margin of the wing; above the small crossvein this band contains a small brown spot, and in the discal cell it is considerably expanded toward the base of this cell; hind crossvein bordered with brown and on the inner side with yellow, which color is prolonged almost across the first posterior cell. Length, 3.5 mm.

Habitat.—Bright Angel Hotel, brink of Grand Canyon, Coconino Co., Arizona.

A female specimen collected July 10 by Mr. H. S. Barber. Type No. 6635, U. S. N. M.

Euaresta stigmatica, sp. nov.

Yellow, the occiput except the upper and lower edges, the thorax and base of scutellum, black, opaque, densely gray pruinose, apex of abdomen of male black; hairs and bristles yellowish, arista except at base brown, proboscis robust, not geniculate, two pairs of dorsocentral bristles, no acrostichals, scutellum bearing four bristles, the apical pair small, ovipositor of female slightly longer than the last two segments of abdomen; wings practically as in *bella* Loew,* except that the stigma is yellowish gray, with a small median brown spot. Length, 3.5–4 mm.

Habitat.—Flagstaff (July 6) and Williams (June 27 and 30), Arizona.

One male and three females collected by Mr. H. S. Barber. Type No. 6636, U. S. N. M.

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* Monographs Diptera North America, III, Pl. X, Fig. 23.

Tephritis gemella, sp. nov.

Yellow, a black spot at the lower front corners of the scutellum, hairs and bristles also yellow, scutellum bearing four bristles; wings reticulate with yellowish-brown, along the costa and at apex with blackish, nearly as in *æqualis* Loew,* except that there are two transverse pairs of hyaline dots on each side of the small crossvein, situated between the latter and the large round hyaline spots; the basal portion of the discal cell as far as the transverse pair of hyaline dots below the small crossveins contains four large hyaline spots; bristles of third vein very sparse and minute; most of the cells contain a few more hyaline dots than occur in the related species. Length, 6 mm.

Habitat.—Las Vegas Hot Springs, New Mexico.

A female specimen collected August 8 by Mr. H. S. Barber. Type No. 6637, U. S. N. M.

Tephritis inornata, sp. nov.

Black, opaque, grayish pruinose, the head and its appendages except center of occiput, the apex of scutellum, the halteres and legs yellow, ovipositor of female largely reddish-yellow; bristles black, the bristly hairs whitish, scutellum bearing four bristles, third joint of antennæ rounded at the apex, proboscis short, rather robust, not geniculate, abdomen without distinct black spots; wings reticulate with dark brown nearly as in *finalis* Loew,† except that the first posterior cell contains a transverse pair of hyaline dots just beyond the hyaline basal spot, and with five hyaline dots beyond this pair, three of which are along the fourth vein and two along the third, also a minute hyaline dot in extreme apex of this cell; apex of discal cell beyond the transverse pair of hyaline dots below and slightly beyond the small crossvein wholly brown; hyaline spots in third posterior cell except the one in extreme apex united to form three large spots; third vein bare. Length, 3 mm.

Habitat.—Las Vegas Hot Springs, New Mexico.

One male and two female specimens collected August 2 to 8 by Mr. H. S. Barber. Type No. 6638, U. S. N. M.

Urellia imperfecta, sp. nov.

Black, opaque, gray pruinose, the head and its members except center of occiput, the humeri, halteres and legs yellow, bristles black, the bristly hairs yellowish; third joint of antennæ rounded at the apex, proboscis short, rather robust, not geniculate, scutellum bearing only two bristles, abdomen unmarked, middle femora without bristles; wings nearly as in *maverna* Walker (*solaris* Loew ‡) except that the brown, Y-shaped mark at apex of wing is wanting except a dot where the base of the branches should be, no gray dot near center of discal cell, a brown streak below middle of penultimate section of fifth vein, the hyaline spot in base of first posterior cell much larger, and there is a hyaline dot close to the third vein in the brown beyond it, the latter does not extend to the second of the two brown crossbands in the second posterior cell. Length, 2.5 mm.

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* Monographs Diptera North America, III, Pl. X, Fig. 20.

† Monographs Diptera North America, III, Pl. XI, Fig. 4.

‡ Monographs Diptera North America, III, Pl. X, Fig. 19.

Habitat.—Williams, Arizona.

A male specimen collected May 28 by Mr. H. S. Barber. Type No. 6639, U. S. N. M.

Family EPHYDRIDÆ.

Dichæta furcata, sp. nov.

Black, the base of third antennal joint, palpi, apex of proboscis, halteres, knees and tarsi except their apices, yellow; head opaque, gray pruinose, the front and face yellowish-gray, the front marked with two black vittæ which converge anteriorly, only one pair of fronto-orbital bristles and nearer to each eye a row of short bristly hairs, several similar hairs on lower part of front, sides of the face and cheeks bearing a row of from seven to nine bristles, and between each row and the adjacent eye is a series of short, bristly hairs; mesonotum yellowish-gray pruinose, three indistinct brown vittæ, pleura bluish-gray pruinose, a brown spot near center of mesopleura, scutellum with a transverse pair of yellowish-gray pruinose spots; abdomen bluish-gray pruinose, segments 2 to 5 in the female, 2 to 4 in the male, each marked with a basal pair of large, subtriangular black spots, in the male the fifth segment is gray pruinose except a median black vitta, and near the apex of its upper side is a slender tubercle which is nearly twice as long as this segment and tipped with a pair of upwardly curving spines, each about two-thirds as long as the tubercle; fourth segment in the male bearing a transverse row of unusually large bristles near its posterior margin; wings yellowish hyaline. Length, 3 to 4 mm.

Habitat.—Biscayne Bay and Lake Worth, Florida.

Three males and two females collected by Mrs. Annie T. Slosson. Type No. 6640, U. S. N. M.

Paralimna nuda, sp. nov.

Black, the third antennal joint, halteres, knees, tibiæ and bases of tarsi yellow; front and face yellow, the occiput gray pruinose, only one pair of orbital bristles; thorax grayish pruinose, mesonotum with a broad median and pair of narrow lateral vittæ, no bristly hairs between the rows of dorsocentral bristles, nor on the sternopleura, no sternopleural bristle, scutellum brown pruinose on the upper side, abdomen bluish-gray pruinose, segments 2 to 5 subequal in length; tibiæ silvery white pruinose, the middle ones each bearing a long bristle near the base and another near the apex; wings whitish hyaline. Length, 2 mm.

Habitat.—Frontero, Tabasco, Mexico.

A male specimen collected on moist sand along a river, March 9 by Mr. C. H. T. Townsend. Type No. 6641, U. S. N. M.

Discocerina incisa, sp. nov.

Black, the lower edge of the front, antennæ, palpi, halteres, front coxæ, knees tibiæ and tarsi except the last two joints, yellow; front brownish, face yellowish pruinose, orbits of both and the cheeks white pruinose, face bearing three pairs of bristles, a bristle at lower posterior corner of each cheek; mesonotum and scutellum olive gray, pleura whitish-gray pruinose; abdomen brownish black pruinose, the last segment and front angles of the two preceding segments whitish pruinose, on the penultimate segment reaching at least nearly halfway to the middle of the dorsum; wings hyaline, apex of second vein slightly beyond the middle between apices of the first and third veins. Length, 1.5 mm.

Habitat.—Vieques Island, Fajardo, Mayaguez, Aguadillo, Utuado and Arroyo, Porto Rico.

Eight specimens collected in January and February, 1889, by Mr. August Busck. Type No. 6642, U. S. N. M.

Parephydra, gen. nov.

Near *Discocerina*, but the ocellar bristles are inserted higher than the lowest ocellus, the oral opening is unusually large, etc. Head with a deep concavity at base of antennæ, face with a low, median carina on the upper part, the remainder convex, at the oral margin projecting farther forward than at any other part, oral margin bare, clypeus hidden, front nearly flat, two pairs of vertical bristles, no postverticals, two pairs of fronto-orbitals, second joint of antennæ bearing two short bristles at the upper inner angle, third joint suborbicular, arista long-pectinate on the upper side, legs without bristles, venation as in the related genus.

Type, the following species:

Parephydra humilis, sp. nov.

Black, the base of third antennal joint, the halteres and tarsi except their apices, yellow; front yellowish, the face light gray pruinose, face bearing three pairs of bristles and one near lower posterior corner of each cheek; body opaque, gray pruinose, whitish on the abdomen, mesonotum except the sides brownish, one pair of acrostichal bristles and one of dorsocentrals, the bristly hairs short, sparse, not arranged in rows, two posthumeral bristles, two mesopleural and one sternopleural, pleura otherwise almost bare, scutellum bearing four bristles; abdomen oval, composed of five segments which increase in length toward the apex; wings hyaline, hind crossvein faintly clouded with brown, apex of second vein slightly beyond the middle of distance between apices of first and third veins. Length, nearly 1 mm.

Habitat.—Hot Springs, Yavapai Co., Arizona.

A single specimen collected June 26 by Mr. H. S. Barber. Type No. 6643, U. S. N. M.

Cœnia bisetosa, sp. nov.

Head and its members black, middle of front bronze green, not pruinose, sparsely covered with short hairs but without long bristles, two pairs of orbital bristles, third joint of antennæ without a long hair, arista rather long-pectinate on the upper side, face and cheeks opaque, light gray pruinose; thorax blackish, opaque, yellowish-gray pruinose, apparently five pairs of dorsocentral bristles, no acrostichals, scutellum bluish, not pruinose, bearing two pairs of bristles, abdomen olive green, broad bases of the last three segments violet bronze, segments two to five slightly increasing in length, the fifth scarcely longer than the fourth; femora olive green, the front ones and anterior side of the others opaque, olive green pruinose, posterior side of the latter polished, tibiæ and tarsi black, front tarsi not thickened, claws strongly arcuate; wings grayish hyaline, marginal cell dark gray, small crossvein noticeably before middle of discal cell; halteres yellow. Length, 4 mm.

Habitat.—Salt Lake, Utah.

A male specimen collected June 25 by Mr. E. A. Schwarz. Type No. 6644, U. S. N. M.

Ephydra pilicornis, sp. nov.

Dark bluish-green, antennæ, mouth parts, tibiæ and tarsi black, the halteres and front knees yellow; three pairs of fronto-orbital bristles, on the inner side of each row is a gray pruinose vitta connected with a similar one on lower edge of front, disc of front without long bristles, face on lower half and along the eyes yellowish-gray pruinose, third joint of antennæ bearing a long bristly hair on the outer side, arista dark brown, short-pectinate on upper side of basal half; mesonotum and scutellum somewhat polished, the front end and sides of the former and the pleura yellowish-gray pruinose, five pairs of dorsocentral bristles, no acrostichals, scutellum bearing two pairs, abdomen slightly polished, segments two to four of nearly an equal length, the fifth almost twice as long as the fourth; wings grayish hyaline. Length, 3.5 mm.

Habitat.—Biscayne Bay, Florida.

A male specimen collected by Mrs. Annie T. Slosson. Type No. 6645, U. S. N. M.

Scatella triseta, sp. nov.

Olive green, the antennæ and tarsi black, the halteres yellow; front yellowish-gray pruinose, somewhat polished each side of the middle, no long bristles on the disc, three pairs of fronto-orbital bristles, face whitish-gray pruinose, a brownish-pruinose vitta in middle of upper half, arista rather long pubescent on the upper side; mesonotum and scutellum opaque, brown pruinose, three pairs of dorsocentral bristles, the anterior pair in front of the suture, no acrostichal bristles, the bristly hairs between the dorsocentral rows arranged in two rows, humeri and pleura olive gray pruinose, on upper portion of the latter partly brown, scutellum bearing four bristles, abdomen opaque, olive gray pruinose, an indistinct brownish fascia at bases of the segments, fifth segment in the male nearly twice as long as the fourth; wings hyaline, marked with four indistinct white dots, of which one is in the submarginal cell above the hind crossvein, one near base and another beyond center of first posterior cell, the remaining dot near apex of discal cell, costal vein reaches apex of fourth vein. Length, 3 mm.

Habitat.—Williams, Arizona.

One male and four females collected June 6 by Mr. H. S. Barber. Type No. 6646, U. S. N. M.

Family AGROMYZIDÆ.

Acrometopia punctata, sp. nov.

Black, the base of antennæ, mouth parts, halteres, knees and middle and hind tarsi except their apices, yellow, antennal arista white, the base yellow; third joint of antennæ three times as long as wide, bluntly rounded at the apex; head, body and legs except the tarsi, opaque, densely gray pruinose, the broad frontal vitta brownish, abdomen rather thickly covered with black dots; wings whitish hyaline, basal half containing about five brown dots, one before and another beyond apex of first vein, one on small crossvein and two near the wing margin in the third posterior cell; a brown fascia crosses the wing, passing over the hind crossvein and inclosing a hyaline drop at the costal end; between this fascia and the wingtip are three brown fasciæ, each inclosing a hyaline dot in the costal end (these fasciæ are regular in one wing but very irregular in the other), where there is a partial fourth fascia. Length, 2.5 mm.

Habitat.—Georgia.

A female specimen collected by H. K. Morrison. Type No. 6647, U. S. N. M.

This European genus has not heretofore been reported from North America; it will be readily recognized by the nearly horizonal front, face and eyes.

Acrometopia maculata, sp. nov.

Black, the antennæ except at apex, the mouth parts, halteres, knees, tibiæ and tarsi yellow, base of antennal arista yellow, the remainder white; third joint of antennæ less than twice as long as wide, the outer apical angle almost rectangular; head, body and femora opaque, densely gray pruinose, segments 2 to 5 of abdomen each marked with a basal pair of round black spots; wings hyaline, marked with brown as follows: A cloud on humeral crossvein, dot near center and another in apex of costal cell, four spots in marginal cell, of which the first three are geminate, submarginal cell crossed by eight streaks, the first posterior with five, a dot near middle of first basal cell, cloud on small and hind crossvein, that on the latter expanded in a spot along fourth vein, two dots along upper edge of second posterior cell, two near center of third posterior cell and streak beyond middle of discal cell. Length, 2 mm.

Habitat.—Baracoa, Cuba.

A female specimen collected in September, 1901, by Mr. August Busck. Type No. 6648, U. S. N. M.

Odinia* immaculata, sp. nov.

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* In 1830 Meigen established the genus *Milichia* for two new species, *speciosa* and *maculata*, figuring the first, with which his generic description agrees better than with the second species. In the same year Desvoidy founded the genus *Odinia* for two new species, *trinotata* and *peleterii;* the latter apparently has not been since

Head light yellow, frontal vitta dark yellow, occiput, except the margin and a notch on upper part, brown, antennæ yellow, the upper edge of the third joint tinged with brown, mouth parts light yellow; mesonotum and scutellum black, opaque, gray pruinose, pleura yellow, the sternopleura largely, and a spot above it, brown; mesonotum between the two rows of four dorsocentral bristles bare except in front of the suture, pleura bare except a few bristles along hind edge of mesopleura and one on the sternopleura; middle of metanotum and entire abdomen dark brown; femora yellow, a preapical brownish spot on the front side of each, tibiæ and tarsi brown; wings hyaline, last section of fifth vein nearly one and one half times as long as the preceding section; halteres yellow. Length, 1.5 mm.

Habitat.—Mt. Washington, New Hampshire.

A single specimen collected by Mrs. Annie T. Slosson. Type No. 6649, U. S. N. M.

Parodinia, gen. nov.

Near *Odinia* but with only two pairs of fronto-orbital bristles, eyes transversely ellipsoidal, etc. Head subquadrate, front convex, two pairs of vertical bristles, one pair of ocellars and a small, cruciate postvertical pair, front below the ocelli as wide as long, bare except for the fronto-orbitals, antennæ porrect, half as long as the head, the third joint orbicular, over twice as long as the second, arista bare, face concave, vibrissæ present, on a level with the oral margin, proboscis short, robust, palpi clavate, auxiliary vein distinct in its basal portion, uniting with the first vein near its apex, costal vein reaches apex of fourth, not incised, third and fourth veins almost parallel, hind crossvein transverse, sixth vein obliterated before reaching the wing margin, anal and second basal cells present but small.

Type, the following species:

Parodinia cinerea, sp. nov.

Head yellow, the occiput, except the lower part, black, gray pruinose, mouth parts and antennæ yellow, third joint of the latter black, cheeks one-third as wide as the eye height; body black, opaque, densely gray pruinose, five pairs of dorsocentral bristles, four supra-alar, one humeral, two posthumeral, one propleural, one near hind edge of mesopleura, two sternopleural and four scutellar bristles, legs yellow, tarsi

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recognized, while *trinotata* is regarded by Schiner as being identical with the *Milichia maculata* of Meigen. This leaves *speciosa* as the type of *Milichia*, and it was so designated by Westwood in 1840 and by Rondani in 1856. In 1843 Loew wrongly selected *maculata* as the type of *Milichia*, and in this he has been followed by Schiner, Osten Sacken, and most recent writers. The synonymy of these two genera is as follows:

Milichia Meigen, 1830; type, *speciosa* Meigen.
  Synon. *Argyritis* Latreille, 1829 (not of Huebner, 1816); no species mentioned.
    Lobioptera Wahlberg, 1847; type, *ludens* Wahlberg.
Odinia Desvoidy, 1830; type, *trinotata* Desvoidy.
  Synon. *Alticomerus* Rondani, 1856; type, *Odinia trinotata* Desvoidy.

brownish, middle and hind femora without bristles, all tibiæ with a preapical bristle; wings hyaline, veins yellow, costa bearing several short, black, spinous bristles, small crossvein near middle of discal cell; halteres yellow. Length, 2 mm.

Habitat.—Los Angeles Co., California.

Three specimens collected by the author. Type No. 6650, U. S. N. M.*

Pseudodinia, gen. nov.

Near *Parodinia* but the vibrissæ wanting, the front wholly polished, etc. Head somewhat hemispherical, front but slightly convex and with a broad, transverse groove below the middle, the portion below the ocelli broader than long, bristles as in the preceding genus, antennæ projecting obliquely downward, less than one third as long as the head, the third joint orbicular, slightly longer than the second, arista bare, face concave, sides of oral opening bearing short hairs, eyes bare, oblique, nearly quadangular, with rounded corners; proboscis short and robust, the labella rather narrow; palpi nearly cylindrical; auxiliary vein indistinct, extending close to the first until near the apex, then separating and ending in the costa, costal vein extended to apex of fourth, not incised, hind crossvein transverse, sixth vein obliterated slightly beyond apex of anal cell, the latter and second basal complete, small; tibiæ bare.

Type, the following species:

Pseudodinia varipes, sp. nov.

Black, the proboscis, halteres, tarsi and apices of tibiæ yellow; thorax subopaque, thinly gray pruinose, two pairs of dorsocentral bristles, the hairs between them not in rows, four supra-alar bristles, one humeral two posthumeral, one near middle of hind edge of mesopleura and one sternopleural, a few hairs in front of the latter, pleura otherwise without hairs, scutellum bearing four bristles; wings hyaline, veins yellowish, changing to brown on the apical portion, second, third and fourth veins nearly parallel, the apices of the third and fourth diverging, last section of fifth vein less than half as long as the preceding section, small crossvein near middle of discal cell. Length, 1.5 mm.

Habitat.—Las Vegas Hot Springs, New Mexico.

Three specimens collected August 3, 8 and 15, by Mr. H. S. Barber. Type No. 6651, U. S. N. M.

Milichia robertsoni, sp. nov.

Black, including the halteres; the front angles of third abdominal segment, a fascia at base of the fourth and whole of the fifth except its apex, silvery white pruinose, wings hyaline, costal incision small. Length, 2 mm.

Habitat.—Inverness, Florida.

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* *Rhicnœssa costalis* Coquillett also belongs to *Parodinia.* It was described from the Galopagos Islands and Mr. Barber collected specimens at Williams, Flagstaff and Bright Angel, Arizona.

A male specimen received from Mr. Charles Robertson. Type No. 6652, U. S. N. M.

Arctobiella, gen. nov.

Near *Eusiphona* but the proboscis is short, robust, not geniculate, the third and fourth veins nearly parallel, etc. Head somewhat hemispherical, front flat, the portion below the ocelli over twice as long as wide, rather densely haired, bristles of head and body scarcely stouter than the hairs, face concave, vibrissæ not differentiated from the adjacent hairs; antennæ about one third as long as the head, the third joint orbicular, slightly longer than the second; arista bare; eyes densely haired; palpi clavate, auxiliary vein extending close to the first but separated from the latter before its apex and ending in the costa, hind crossvein transverse, costa not incised, costal vein reaches apex of the fourth; sixth vein obliterated far before reaching the wing-margin, anal and second basal cells present but small.

Type, the following species:

Arctobiella obscura, sp. nov.

Black, including the halteres; cheeks about one sixth as wide as the eye height; body opaque, somewhat velvety, mesonotum and pleura rather densely haired, scutellum bearing a marginal row of bristly hairs, abdomen greatly depressed, less than twice as long as wide; legs short and rather robust; tibiæ without bristles; wings pale brownish, small crossvein near middle of discal cell. Length, 4 mm.

Habitat.—Laggan, British Columbia.

A single specimen collected by Prof. H. F. Wickham. Type No. 6653, U. S. N. M.

Desmometopa luteola, sp. nov.

Yellow, the arista and bristles black; wings hyaline, third and fourth veins nearly parallel, last section of fifth vein less than one fourth as long as the preceding section, small crossvein near two-thirds length of discal cell. Length, nearly 2 mm.

Habitat.—Williams, Arizona.

A single specimen collected June 30 by Mr. H. S. Barber. Type No. 6654, U. S. N. M.

Agromyza picta, sp. nov.

Black, the proboscis, sides and posterior part of mesonotum, scutellum, upper half of pleura, halteres, and abdomen except the last two segments and middle of the preceding, yellow; body polished, four pairs of dorsocentral bristles, the anterior pair in front of the suture, the bristly hairs between them not disposed in rows, a large space in front of scutellum destitute of hairs; wings hyaline, faintly tinged with smoky brown along the costa, last section of fifth vein slightly shorter than the preceding section. Length, 3 mm.

Habitat.—Frontera, Tabasco, Mexico.

A single specimen collected March 5 by Mr. C. H. T. Townsend. Type No. 6655, U. S. N. M.

Agromyza parvicella, sp. nov.

Black, the cheeks, sides of face, proboscis, halteres, and knees, yellow, lower part of front yellowish-brown; thorax opaque, gray pruinose, four pairs of dorsocentral bristles, the anterior pair in front of the suture, the hairs between them in two rows; wings grayish hyaline, veins brown, last section of fourth vein slender, last section of fifth five times as long as the preceding section, small crossvein at two-thirds of length of the unusually small discal cell. Length, 2 mm.

Habitat.—St. Paul Island, Alaska.

A single specimen collected by Prof. Trevor Kincaid. Type No. 6656, U. S. N. M.

Agromyza flavonigra, sp. nov.

Head and its members yellow, an ocellar dot, occiput except the margin, the arista and bristles black; body yellow, hairs and bristles black, mesonotum black, the sides, front angles, four vittæ and spot in front of scutellum yellow, a black humeral dot, an irregular, interrupted vitta on lower part of pleura, large spot on sternum in front of middle coxæ, spot on each side of scutellum at base, fascia at bases of abdominal segments three and four, two pairs of dots on segment five and whole of six, black; mesonotum somewhat opaque, four pairs of dorsocentral bristles, the anterior pair in front of the suture, the hairs between them not in rows; coxæ and femora yellow varied with black, tibiæ and tarsi wholly black; wings hyaline, veins brown and of nearly equal thickness, last section of fifth vein one and one-half times as long as the preceding section; halteres yellow. Length, 3 mm.

Habitat.—Beulah, New Mexico.

Two specimens collected June 29 and in July by Prof. and Mrs. T. D. A. Cockerell. Type No. 6657, U. S. N. M.

Agromyza varifrons, sp. nov.

Black, the lower half of front, antennæ, face, cheeks, mouth parts, halteres, knees and bases of tarsi, yellow; mesonotum somewhat polished, two pairs of dorsocentrals, the bristly hairs between them not in rows; wings hyaline, veins brown, of nearly an equal thickness, last two sections of fifth vein subequal in length. Length, 1.5 mm.

Habitat.—District of Columbia.

A single specimen collected by the writer. Type No. 6658, U. S. N. M.

Agromyza pruinosa, sp. nov.

Black, the halteres and knees yellow, lower half of frontal vitta, antennæ, depressions of face, lower edge of cheeks and the mouth parts, reddish-yellow; mesonotum rather densely whitish-gray pruinose, four pairs of dorsocentral bristles, the anterior pair in front of the suture, the hairs between them not in rows; wings hyaline, veins brown, of nearly an equal thickness, apical portions of third and fourth veins strongly diverging, last two sections of fifth vein subequal in length. Length, 2.5 mm.

Habitat.—Colorado.

A single specimen collected by Mr. H. K. Morrison. Type No. 6659, U. S. N. M.

Agromyza viridula, sp. nov.

Black, the body, especially the abdomen, greenish, halteres white, apex of proboscis yellowish-brown; mesonotum somewhat polished, two pairs of dorsocentral bristles, the hairs between them numerous, not disposed in rows; wings hyaline, veins brown, of nearly an equal thickness, last section of fifth vein two thirds as long as the preceding section, small crossvein near one-third of length of discal cell. Length, 2 to 2.5 mm.

Habitat.—District of Columbia (Coquillett, in June); Beverly, Massachusetts (Burgess, June 29); Georgia (Morrison); and Aguadilla and Mayaguez, Porto Rico (Busck, in January).

Five specimens. Near *neptis*, but that species has three pairs of dorsocentral bristles, small crossvein at middle of discal cell, etc. Type No. 6660, U. S. N. M.

Hemeromyia, gen. nov.

Near *Agromyza* but the vibrissæ distinctly above the front edge of the oral margin, face strongly convex, etc. Head somewhat quadrangular, front convex, the portion below the ocelli broader than long, bristles as in *Parodinia* except that the postvertical pair is diverging; antennæ scarcely one-sixth as long as the head, the third joint orbicular, arista bare, face retreating at the oral margin, a row of bristles on lower portion of cheeks, eyes transversely oval, bare; proboscis short and robust; palpi clavate; costal vein reaching apex of fourth, not incised, auxiliary vein indistinct, its apical portion united with the first, the second, third and fourth veins nearly parallel, hind crossvein transverse, anal and second basal cells present but small, sixth vein obliterated before reaching the wing margin.

Type, the following species:

Hemeromyia obscura, sp. nov.

Black, the face and cheeks yellow, antennæ, palpi and halteres brownish-yellow, knobs of halteres whitish; front opaque, the ocellar triangle and orbits slightly polished, cheeks one sixth as wide as the eye height; mesonotum almost without hairs, bearing four pairs of dorsocentral bristles, four supra-alar, one humeral, two posthumeral, mesopleura with one bristle and a row of hairs along the posterior edge and a bristle near middle of lower edge, a small pteropleural bristle, sternopleura bearing one bristle and a few hairs, scutellum bearing four bristles, tibiæ without bristles, wings hyaline, last section of fifth vein one-fifth as long as the preceding section, small crossvein at three-fourths length of discal cell. Length, 1.5 mm.

Habitat.—Las Vegas Hot Springs, New Mexico.

A single specimen collected August 11 by Mr. H. S. Barber. Type No. 6661, U. S. N. M.

Phytomyza palliata, sp. nov.

Yellow, an ocellar dot, occiput except lower margin, and mesonotom except the sides and hind margin, black, center of sternopleura and bases of abdominal segments, brownish; bristles black; mesonotum opaque, gray pruinose, bearing only a few hairs, four pairs of dorsocentrals; wings hyaline, fourth vein as strong as the third, hind crossvein wanting. Length, 1.5 mm.

Habitat.—Mesilla Park, New Mexico.

A single specimen bred from *Portulaca* August 10 by Prof. T. D. A. Cockerell. Type No. 6662, U. S. N. M.

Phytomyza bicolor, sp. nov.

Black, the labella, halteres and abdomen except the last segment and base of the preceding, yellow; thorax thinly grayish pruinose, four pairs of dorsocentral bristles, the hairs between them numerous, not arranged in rows; wings hyaline, veins yellowish, fourth vein subhyaline, noticeably more slender and less distinct than the third, hind crossvein wanting. Length, 3 mm.

Habitat.—Niagara Falls, New York.

A single specimen collected June 23 by Mr. C. W. Johnson. Type No. 6663, U. S. N. M.

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NEW FORMS OF CULICIDÆ FROM NORTH AMERICA.

By D. W. Coquillett.

Corethrella, gen. nov.

Near *Corethra* and *Mochlonyx*, but differing from both in having the antennæ wholly covered with hairs and the apical joints shorter than the intermediate ones. Antennæ 14-jointed, the first joint unusually large, bulbous, twice as wide as long, the remaining joints slender, elongate, wholly covered with hairs, which are very dense in the male but very sparse in the female, in both with a sparse whorl of bristles near base of each joint, the second joint with an additional whorl before the middle, the hairs and bristles noticeably sparser and shorter on the last three joints than on the preceding ones, hairs on the sixth joint in the male over four times as long as that joint and but slightly shorter than the bristles, in the female the longest hairs on the sixth joint are about half as long as that joint and about one-fourth as long as the bristles, antennæ only slightly thickened at the insertion of the whorls of bristles, second joint slightly longer than the third, about four times as long as wide, joints three to eleven becoming successively a trifle longer, the last three joints each slightly shorter than the eleventh; proboscis scarcely longer than height of head, palpi inserted slightly beyond its middle, nearly twice as long as the proboscis, eyes widely separated, deeply emarginate opposite insertion of antennæ, no ocelli, first tarsal joint much longer than the second, venation as in *Culex*. Type *Corethra brakeleyi* Coquillett.

The radical structural differences existing between the larva of the present form and that of a typical species of *Corethra* have already been commented upon by Prof. J. B. Smith, and are clearly shown in the excellent figures published by Dr. Dyar in the present number of the JOURNAL. This and the further fact that the structure and pilosity of the antennæ of the adults are markedly different, clearly indicate the desirability of separating these two forms into distinct genera.

Anopheles eiseni, sp. nov.

Near *maculipennis*, but with a patch of whitish scales on the first vein before its middle and another at its apex, also the apical fourth of the hind tibiæ is yellowish-white. Black, the stems of halteres whitish, coxæ and a vitta on lower part of pleura, yellow, femora yellowish-brown, apical fourth of hind tibiæ yellowish-white; antennæ of male whitish, the first joint, last two and fascia on each of the others, brown; scales of palpi black, those at apex and two bands in the female, three in the male, white; scales of occiput black, those in middle of upper part white; mesonotum grayish pruinose, marked toward each side with a velvet black vitta; scales of abdomen black, the hairs yellowish, scales of femora and tibiæ mixed black and whitish, those on the apical whitish portion of hind tibiæ white, those on the tarsi black; tarsal claws of female simple; wings hyaline, the veins and scales brown, a dense patch of black ones at base of second vein, a larger one on the crossveins and a small one at bases of first submarginal and of second posterior cell, a small patch of yellowish-white scales on first vein before its middle and another at its apex, the latter spot encroaching upon the costal vein. Length, 3.5 mm.

Habitat.—Aguna, Guatemala (2,000 feet altitude).

One female and two males received by Dr. L. O. Howard from Professor Gustav Eisen, of San Francisco, Cal., who has brought to light several interesting forms in this family, and to whom this species is respectfully dedicated. Type No. 6699, U. S. National Museum.

Culex dyari, sp. nov.

Near *sylvestris*, but with a pair of bare vittæ on the mesonotum, simple tarsal claws in the female, etc. Dark brown, thorax more reddish-brown, stems of halteres, coxæ and greater portion of posterior side of femora, yellow; antennæ of male largely white on the intermediate short joints, the plumosity brown, with a yellow base; scales of palpi brown, the female having those at the apices white, the male with four rings of whitish ones, last joint of male palpi dilated, scales of occiput narrow, yellowish, a large patch of broad whitish ones on each side, the upright ones black; scales of thorax light yellowish, those of the abdomen black and with a broad band of yellowish-white ones at base of each segment; scales of legs black, mixed with a few yellow ones, those on the coxæ, on posterior side and at apices of femora and tibiæ, and at each end of the first three joints of the tarsi, yellowish-white; front tarsal claws of male bearing two teeth beneath one of the claws and one tooth beneath the other; wings hyaline, veins and scales brown, many of the lateral scales on the auxiliary and first veins are rather broad and distinctly taper to the base, the other lateral scales chiefly elongate, narrow and almost linear, second basal cell much shorter than the first, petiole of first submarginal cell over one-third as long as that cell. Length, 4 mm.

Habitat.—Center Harbor, N. H.

Three females and one male bred by Dr. H. G. Dyar, whose patient investigation of the larvæ of this family has resulted in a better understanding regarding the limits of the species, and to whom this unique species is respectfully dedicated. Type No. 6700, U. S. N. M.

Culex melanurus, sp. nov.

Near *pipiens*, but without distinct bands of light-colored scales at bases of the abdominal segments, the lateral scales on the wing veins rather broad and distinctly tapering at the base, etc. Black, the stems of the halteres and posterior and under sides of the femora, yellow, the intermediate short joints of the male antennæ largely white, palpi of male not dilated; scales of occiput narrow, yellowish-white, a patch of broad white ones on each side, the upright ones black, scales of mesonotum golden yellow, those of the abdomen violaceous brown, a small patch of white ones at front angles of the segments beyond the second, those on middle of venter yellowish-white, scales of legs purplish-brown, in certain lights with a brassy tint, those on the yellow portion of the femora whitish; tarsal claws of female simple, the front and middle ones in the male one-toothed; wings hyaline, second basal cell much shorter than the first, petiole of the first submargined cell nearly one-third as long as that cell. Length, 3.5 mm.

Habitat.—Center Harbor, N. H.

Two females and two males bred by Dr. H. G. Dyar. Type No. 6701, U. S. N. M. The specific name was given in allusion to the distinctly blackish anal tube of the larva.

Culex trivittatus, sp. nov.

Near *triseriatus*, but with three vittæ of blackish scales on the mesonotum. Black, the first joint of antennæ and base of second, the coxæ and greater portion of femora, yellow; scales of palpi black, those on the occiput light yellow, a large patch of dark gray ones on each side of the middle, the upright ones yellow; scales of mesonotum brassy yellow and with three broad vittæ of blackish ones, the median vitta not quite extending to either end of the mesonotum; scales of abdomen black, those at the front angles of the segments and on the venter whitish; scales of legs black, those on the coxæ and on the posterior side of the femora and tibiæ, covering nearly the whole of the hind femora, yellowish-white; tarsal claws rather large, one-toothed; wings hyaline, lateral elongated scales of the veins narrow and almost linear, second basal cell shorter than the first, petiole of first submarginal cell nearly one-half as long as that cell. Length, 4 mm.

Habitat.—Chester, New Jersey.

Two female specimens collected September 10 and 14 by Prof. J. B. Smith. Type No. 6702, U. S. N. M.

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ILLUSTRATIONS OF THE LARVÆ OF NORTH AMERICAN CULICIDÆ.—II.

BY HARRISON G. DYAR, PH.D.

(PLATES XVI–XIX.)

I have previously published illustrations of four species of Culicidæ in this journal (Journ. N. Y. Ent. Soc., IX, 177–182, 1901); the present paper is a continuation of the subject.

Culex canadensis *Theobald.*

Egg.—Laid singly, not adherent, scattered or adhering in irregular masses by surface tension only. Fusiform, the ends rounded, the greatest diameter at the third nearest the micropyle; one side flattened. Entirely black, covered with clear granules which rest in reticular hollows of the surface; a small colorless cushion at the micropyle. Length, .8 mm.; diameter, .2 mm.

Stage I.—Head rounded, darkly infuscated, antennæ slender, uniform, the tuft at the middle of the joint slight; dark throughout. Body hairs normal, simple; air tube colorless at the base, the terminal third darkly infuscated, the line dividing these areas sharp, oblique; a sparse double pecten on the clear part. Anal segment with a dorsal dark plate and terminal tuft; no ventral brush. Lateral comb of the eighth segment a series of simple thorn-shaped spines, about 6 in number, in a straight transverse row.

Stage II.—The head is pale brown rather than blackish. Antennæ all brown, the slight tuft at the middle of the joint. Body hairs stouter, with distinct basal tubercles on the thorax. Air tube completely chitinized, brown with a double pecten on the posterior basal half, followed by a little hair tuft. Tube conically tapered, about two and a half times as long as wide. Anal segment with a broad dorsal dark plate, terminal tuft and small ventral brush arising from a transversely barred area at the tip of the segment; also several small tufts preceding this barred area. Lateral comb a patch of spines, low triangular in shape, about three rows deep in the center.

Stage III.—Head slightly paler, the base of the antennæ paler than the tip, the tuft arising a little before the middle. Otherwise as before, but the ventral brush stronger, and the comb of the eighth segment contains more numerous spines.

Stage IV.—(Pl. XVI, Fig. 1.) Head pale brown, the antennæ darker on the outer third, but brownish throughout; tuft arising a little before the middle, slight, not long enough to reach to the tip of the joint. Thoracic hairs finely, weakly barbuled, arising from large infuscated tubercles. Abdominal hairs simple, moderate, double as far back as the seventh segment. Anal segment with a broad dorsal plate which reaches nearly to the ventral line but does not enclose the segment. Dorsal tuft and ventral brush normal, the latter with small tufts before the barred area. Tube conic, tapered, about two and a half times as long as wide, with two rows of pecten at the base (Fig. 1, *A*), followed by a little tuft. Lateral comb of the eighth segment a patch of small spines in triangular form, over three rows deep (Fig. 1, *B*).

Pupa.—The usual shape and appearance, rather large, the air tubes moderate, funnel-shaped narrowed at base.

Dr. John B. Smith has given an account of the life-history of this species (Ent. News, XIII, 267, 1902). His conclusions agree in the main with my observations except in regard to the matter of hibernation, which is in the egg stage (Science, N. S., XVI, 672, 1902).

Culex atropalpus *Coquillett.*

Egg.—Elliptical, the ends abruptly narrowed, making them round pointed, the antemicropylar one more sharply so and a slight narrowing of the whole egg toward this end. Deep black, the coarse reticulations filled by clear granules and a clear annular cushion at the micropylar end, the whole covered by a layer of mucilage. Length, .6 mm.; width .2 mm. Laid separately in groups adherent to the surface on which they are deposited.

Stage IV.—(Pl. XVI, Fig. 2.) Head rounded, dark brown, nearly black; antennæ slender, small, uniform, the tuft at the middle of the joint and reduced to but one inconspicuous hair. Body hairs normal, moderate, thoracic ones slightly barbuled, abdominal ones simple, several-haired. Tube short, not over twice as long as wide, cles. Tube about twice as long as wide, conic-tapered, brown infuscated, with posterior double pecten and small tuft. Anal segment completely ringed, brown with normal tuft and ventral brush, the latter without tufts before the barred area. Latera comb of the eighth segment a small patch of rather large thorn-shaped spines scarcely more than two rows deep. Anal finger-shaped processes often very small, scarcely longer than wide.

Pupa.—Normal, not distinguishable from allied species.

Culex pipiens *Linnæus.*

Stage IV.—(Pl. XVII, Fig. 3.) Head rounded, full at the sides, pale; antennæ large and long, completely infuscated or, in pale specimens, somewhat lighter at the base, the tuft at the outer third of the joint and the part beyond it more slender than the basal part. Abdominal hairs stout, moderate, the thoracic ones with infuscated tubercles and scarcely barbuled, abdominal ones double, but slight. Tube four times as long as wide, strongly tapered on terminal half, pale brown; a small weak double posterior pecten followed by several tufts of hair. Anal segment completely ringed by the plate, pale brown; tuft and brush normal, the latter confined to the barred area. Comb a large patch of small spines in a low triangle about four rows deep (Fig. 3, *B*).

Culex melanurus *Coquillett.*

Egg.—Laid singly and separate, floating on the surface. Elliptical, rounded rather bluntly at one end, tapering to the other which is smaller, but also rounded; one side flattened; finely granular with rounded, projecting granules which are larger at the ends, conspicuously so at the big end, forming a sort of cap which terminates on the flattened side in a slight ridge. On the central part of the egg the sculpturing resembles a fine shagreen. Opaquely sordid white, the ends black. Length, .9 mm.; width, .15 mm.

Stage III.—Head rounded, pale brown, the antennal tuft at the outer fourth of the joint, the short terminal part slenderer than the basal part, all infuscated and darker than the head. Body hairs numerous on the thorax but rather short and with small basal tubercles, slightly barbuled; abdominal ones becoming smaller posteriorly. Tube rather more than four times as long as wide, a little bent and only slightly tapering, being three fourths as wide at tip as at base; a small weak double pecten, unusually closely placed and followed by several slight irregular tufts. Comb a single row of spines produced into long pointed bars. Anal segment with a dark brown oval dorsal plate, not reaching the middle of the sides; brush and tuft normal; rather slight, the latter confined to the barred area.

Stage IV.—(Pl. XVIII, Fig. 1) Head dark brown, the long slender curved antennæ with the tuft at the outer fourth as before, the basal part rather coarsely spined; all dark brown. Body hairs rather stout, short, the abdominal ones slighter posteriorly. Tube about five times as long as broad, slightly uniformly tapered, dark brown, the tip black; double basal pecten, closely placed as before and followed by scattering tufts. Comb a single row of long bars (Fig. 1, *B*).

Pupa.—Normal, small, the air tubes short funnel-shaped, narrowed at base.

Culex dyari *Coquillett.*

Stage IV. — (Pl. XVIII, Fig. 2.) Head rounded, pale brown; antennæ stout, the tuft at the outer third and the part beyond it smaller, strongly infuscated at the tip and very narrowly so at the base, the center of the joint broadly pale whitish. Body hairs stout, rather long, from infuscated tubercles on both thorax and abdomen. Tube about four times as long as broad, tapering rather abruptly beyond the middle, the tip not tapered; a small, double, approximate basal pecten, not followed by any hair tufts. Anal segment completely ringed, the chitin darker and covered with numerous little spines dorsally, pierced ventrally by seven little holes for a series of tufts that precede the barred area; brush and tuft normal. Comb a large patch of numerous small spines, many rows deep (Fig. 2, *B*).

Pupa.—Normal, the air tubes funnel-shaped.

Culex restuans *Theobald.*

Egg.—Laid in a large boat-shaped mass as in *C. pipiens*, the eggs adhering by their sides and standing perpendicularly to the water, the mass floating freely. Elliptical, fusiform, the end sharply tapered, the micropylar one less so; smooth, finely shagreened, brown black without mucilage, the shell rather thin. Length, .6 mm.; width, .2 mm.

Stage I.—Head rounded, nearly colorless, the eyes round, scarcely transverse; antennæ moderate, rather stout, with long terminal hairs, uniform, the tuft a little before the middle of the joint, composed of two hairs which are long enough to reach beyond the tip. Body hairs slight but rather numerous. Tube somewhat fusiform, about three times as long as wide, the outer half infuscated, the basal half colorless with slight double pecten followed by several hairs; division of the infuscated area irregular. Anal segment with a rather large dorsal plate; terminal tuft double, normal; no ventral hairs. Comb of nine spines in a straight transverse row.

Stage II.— Head rounded, pale, eyes still round; antennæ proportionately smaller, stout, the outer half a little more slender, the tuft at the middle, weakly infuscated outwardly. Body hairs slight, becoming single posteriorly. Tube pale brown, conically tapered, about three times as long as wide, a double many-toothed pecten followed by several hairs. Anal segment as before with the small ventral brush added. Comb of 16 spines in an irregular double row.

Stage III.— Head as before, the antennæ more distinctly infuscated at tip and more markedly smaller on the outer half. Tube about three and a half times as long as wide with pecten and hairs as before. Anal segment broadly plated, the ventral brush confined to the barred area. Comb a triangular patch of spines about three rows deep.

Stage IV.— (Pl. XVIII, Fig. 3.) Head pale brown, the eyes transverse; antennæ moderate, the tuft at the middle, the basal half pale, the outer half smaller and infuscated. Thoracic hairs numerous, rather short, from infuscated tubercles; abdominal hairs slight, single posteriorly. Tube four times as long as wide, pale brown, gently tapering on the outer half, the pale double pecten (Fig. 3, *A*) followed by a few long hairs. Anal segment completely ringed, a few spines on the posterior half dorsally, tuft and brush normal, the latter confined to the barred area. Comb a triangular patch of little spines four rows deep.

Pupa.— Normal, air tube slender, cylindrical, curved, rather long and not funnel-shaped.

Coretha brakeleyi *Coquillett.*

This larva has been referred to by Dr. John B. Smith (Can. Ent., XXXIV, 139, 1902) and by myself (Proc. Ent. Soc. Wash., V, 50, 1902). The specimens from which the figure (Pl. XIX, Fig. 1) was made were received from Dr. Smith, who, with Mr. J. Turner Brakeley, is originally responsible for the association of larva and adult. I have recently been able to confirm their work by breeding larvæ kindly sent me by Mr. Brakeley.

The larva is in general of a culicid type, breathing air by a normal air tube and furnished with hair tufts. The peculiarly shaped antennæ suggest a predaceous habit.

Corethra trivittata *Loew.*

This larva (Pl. XIX, Fig. 2) resembles that of *C. plumicornis* as figured by Westwood (Int. Class. Ins., II, 315, 1840, Fig. 124, 12 and 13). It is not of a culicid type, but resembles the Cheironomids. It has no air tube and never comes to the surface, taking air from the water through the body walls. The head has a peculiar projection in front from which depends a double hook (Fig. 2, *C*), which seems to be the antennæ. It is used for seizing prey, as the larva is predaceous. The thorax is swollen, the segments consolidated and contains a pair of curved air bubbles; a similar smaller pair is situated in the seventh abdominal segment. Abdomen smooth, without hairs, gradually tapering behind, almost perfectly transparent. Anal segment with two dorsal hairs and a large ventral brush composed of single barbuled hairs, not tufts; four anal finger-shaped processes.

The pupa is shown side and front views (Fig. 2, *D* and *E*). It remains upright in the water or resting on the bottom, very rarely coming to the surface. Larvæ in dirty marshes, Center Harbor, New Hampshire.

EXPLANATION OF PLATES.

PLATE XVI.

Fig. 1. Larva of *Culex canadensis* THEOB., stage IV. *A*, one of the pecten teeth of the air tube enlarged; *B*, the lateral comb of the eighth abdominal segment enlarged.

Fig. 2. Larva of *Culex atropalpus* COQ., stage IV.

Fig. 3. Larva of *Culex sylvestris* THEOB., stage IV.

PLATE XVII.

Fig. 1. Larva of *Aëdes fuscus* O.-S., stage IV.

Fig. 2. Larva of *Culex sollicitans* WALK., stage IV.

Fig. 3. Larva of *Culex pipiens* LINN., stage IV.

PLATE XVIII.

Fig. 1. Larva of *Culex melanurus* COQ., stage IV.

Fig. 2. Larva of *Culex dyari* COQ., stage IV.

Fig. 3. Larva of *Culex restuans* THEOB., stage IV.

PLATE XIX.

Fig. 1. Larva of *Corethra brakeleyi* COQ.

Fig. 2. Larva of *Corethra trivittata* LOEW. *A*, mature larva, side view; *B*, the same, back view; *C*, head of larva, side view, enlarged, the mouth parts in part opened; *D*, pupa, ventral view; *E*, the same, side view.

A REVIEW OF THE GENUS ETHMIA WITH DESCRIPTIONS OF NEW SPECIES.

BY HARRISON G. DYAR.

The North American species now referred to the genus *Ethmia* (*Psecadia*) may be separated by the following:

SYNOPSIS OF SPECIES.

1. Fore wing black with white discal ray.................... **albistrigella**
   Fore wing not black.................... 2
2. Abdomen with basal segment blackish, the rest ocherous, unspotted.................... 3
   Abdomen ocherous or fuscous, the basal segment concolorous.................... 4
3. Fore wing gray with four or five black dots.................... **fuscipedella**
   Fore wing with black streaks and dashes.................... **monticola**
4. Fore wing with a narrow white shade separating the costal gray portion from the lighter inner portion.................... 5
   Fore wing with uniform ground color, the shade not defined.................... 7
5. This shade interrupted by two black spots.................... 6
   This shade not so interrupted.................... **mirusella**
6. Lighter colored.................... **arctostaphylella**
   Darker colored.................... **obscurella**
7. With many black streaks and dashes.................... 8
   With rounded spots, comparatively few or no dashes.................... 11
8. Abdomen ochraceous.................... 9
   Abdomen gray dorsally.................... **confusella**
9. Wings uniformly colored.................... 10
   Wings with costal half dark, inner half light.................... **semitenebrella**
10. Fore wings darkly shaded.................... **discostrigella**
    Fore wings not darkly shaded.................... **subcærulea**
11. Costal part of wing shaded with black or brown.................... 12
    Costal part white, at most with blackish irrorations.................... 17
12. Costal shade with attached spots covering cell.................... 13
    Costal shade not covering cell, fused to the discal spots.................... **hagenella**
13. Costal shade irregularly edged below, fused to spots.................... 14
    Costal shade sharply edged below, thrice excavate.................... 16
14. Costal shade diluted, not continuous.................... 15
    Costal shade solidly brown.................... **semilugens**
15. Abdomen ochraceous.................... **josephinella**
    Abdomen pale grayish with tip ochraceous.................... **marmorea**
16. Inner marginal area pure white.................... **trifurcella**
    Inner marginal area grayish irrorate.................... **semiombra**
17. Fore wing with many blackish spots.................... 18
    Fore wing with only three spots.................... { **texanella** / **chambersella** }

18. Spots rounded, not produced into dashes...................... .....**apicipunctella**
    Many of the spots elongated into rounded dashes..................................19
19. Ground color of fore wing white throughout............................. 20
    Fore wing irrorate with black scales on costal third.......................**zellerlella**
20. Larger; two dashes and spot on outer half of wing centrally are separate. **longimaculella**
    Smaller; these dashes and spot joined into a long dash...... ....**coranella**

In the following notes on individual species the references are omitted as I have given them in Bulletin 52, U. S. National Museum, which is now in press. The present paper, however, was begun after the Bulletin was in type, so that the result of this work is not included.

Ethmia albistrigella *Wals.*

This species is very distinct with its black wings and narrow white stripe. The dorsal plate of the male genitalia is broadly furcate, the branches wide and rounded. The National Museum has specimens from Placer Co., Cal., June (Koebele); Siskiyou Mts., 6,000 ft. (coll. Walsingham); Palo Alto, Cal. (Dr. William Barnes); Los Angeles, Cal. (Coquillett), and Yosemite Valley, Cal. (Dyar).

Ethmia fuscipedella *Wals.*

This specles is likewise unmistakable. The dorsal plate of the male genitalia is broad, widely cleft at tip, the branches rounded. Our localities are Ames, Iowa (Osborn), and West Point, Neb.

Ethmia monticola *Wals.*

A single specimen in poor condition from East Portland, Oregon, May 25, 1892 (Dyar), seems referable here.

Ethmia arctostaphylella *Wals.*

In the male the anal plate is moderately broad, curved over, the broad points well separated and deeply, roundedly incised between. Side pieces broadly strap-shaped, curved inwards and a little upwards. Besides two specimens from Lord Walsingham's collection the National Museum has one from San Bernardino, Cal. (Coquillett).

Ethmia obscurella *Beut.*

Indistinguishable from *arctostaphylella* except by the general darker coloration. The male genitalia show no appreciable differences. We have only Mr. Beutenmüller's types.

Ethmia mirusella *Chamb.*

Psecadia albicostella BEUT.

I have one worn specimen of *mirusella* from Lord Walsingham's collection and Mr. Beutenmüller's type of *albicostella*. I can see no difference between them. Mr. Beutenmüller's type is, unfortunately, a female, not a male, as stated in the original description, so I cannot compare the genitalia. Those of *mirusella* are peculiar. The anal plate ends in a single tapering spine; the side pieces are broad, triangular, the upper angle bent in a rounded projection with four coarse black spines below it.

Ethmia discostrigella *Chamb.*

Not uncommon in the foothills of the Rocky Mountains, Arizona and southern California. The fore wings have the gray-white ground color thickly overlaid with blackish scales, so that it only appears in streaks along the lower edge of the cell, mixed with the short black dashes. The male genitalia have the anal plate broad, rounded, convex, bent down sharply from the base, broadly cleft at the tip, pale brown and thin; the side pieces are broadly triangular, curved inward at the upper angle.

Huachuca Mts., Ariz., May 8–23 (Barnes); Glenwood Springs, Col. (Barnes); Arizona (Morrison, Walsingham's coll.); Utah, June (Koebele?); Los Angeles, Calif. (Coquillett); Monument Park, Col., July 19, 1877 (Coll. C. V. Riley); Beulah, New Mex. (Cockerell); Fort Grant, Ariz. (Hubbard); Santa Clara [Col.?] June 27, 1875 (Wheeler survey); Manitou, Col., May 2, 1891 (Dyar); Central City, Col. (Caudell); Sedalia, Col., June 15, 1901 (Dyar & Caudell); foothills above Golden, Col., May 13, 1901 (Dyar & Caudell).

Ethmia semitenebrella, sp. nov.

Marked like *discostrigella*, the black streaks larger and more conspicuous, costal half of wing shaded in blackish, inner half nearly pure gray white. This is probably only a variety of the preceding. The distribution is the same. The male genitalia do not differ. U. S. Nat. Mus., type No. 6621.

Fort Grant, Ariz., July 20 (Hubbard); Colorado (coll. Beutenmüller); Huachuca Mts., Ariz., July 1–7 (Barnes); Glenwood Springs, Col., July 24–30 (Barnes); Los Angeles, Calif., Aug. (Coquillett); Chiricahua Mts., Ariz., June 26 (Hubbard); Williams, Ariz., Dept. Agric., No. 9450, July 31, 1901 (E. A. Schwarz).

Under the Department of Agriculture, Insectary number 9450, Mr. Schwarz collected the larvæ on *Cercocarpus parvifolius*. They are of Pyralid shape, moderately slender, cylindrical, tapering a little behind. Feet normal, the abdominal ones long and slender as in some Pterophorids. Head rounded, flattened before, held flatly, rather thick and not markedly bilobed, apex in joint 2. Whitish, thickly streaked with red brown over the sides and vertex, leaving the face and a streak on the front of the lobe above broadly pale, enclosing a brown dot at tubercle ii; sutures of clypeus brown, mouth sordid. Body without cornified shields, the tubercles small, marked in velvety black, ia + ib, iia + iib, iv + v on thorax, iv + v on abdomen, vii of three distinct tubercles in a line. Broad whitish dorsal and substigmatal bands, the dorsal one continuous on joints 2 to 13, the substigmatal one obsolete at the ends. Sides finely streaked in blackish, largely transversely so, with traces of a pale subdorsal line and containing large black spots on tubercles i, ii and iii; subventer blackish mottled but less distinctly than the sides and more diffusely; venter grayish shaded except between the feet. Feet all pale, the thoracic ones brownish tinted. The larvæ are in alcohol and I cannot determine whether the general color when living was whitish or greenish. Mr. Schwarz does not recollect what the life habits of the larvæ were.

Ethmia subcærulea *Wals.*

Near to *discostrigella* and perhaps only a local form of that species. The bright gray ground color is only a little obscured by blackish scales. The male genitalia are the same.

Blue Lake, Cal. (coll. Walsingham); San Bernardino, Cal. (Coquillett); Cal. (coll. Beutenmüller); Palo Alto., Cal. (Barnes).

Ethmia confusella *Walk.*

I identify six specimens from Key West, Florida, as this species. The ground color is light gray with very numerous black dashes and dots. The anal plate ends in a single spine. Side pieces broad, rounded, curved inward at the ends, with a curved, thick spine at upper angle, both this spine and the anal spine dark brown.

Ethmia josephinella, sp. nov.

Thorax rubbed, the patagia white. Fore wings ochraceous white, the costal half shaded with brown in a dense irroration, its lower edge in the cell composed of a number of large, rounded, confluent spots and a spot on vein 4, above which a projection runs out almost to the margin; four spots below the median vein, somewhat diffuse, and a patch of scales about the middle of the inner margin; a row of terminal dots. Hind wing pale, semitranslucent, dark at tip. Abdomen ochraceous. Expanse, 24 mm.

One male, Dripping Spring, Organ Mts., New Mexico (Cockerell). U. S. Nat. Mus., type No. 6622.

The ornamentation is much as in *hagenella*, but more confused. It also much resembles *E. marmorea*, but the genitalia differ markedly. The anal plate ends in a single spine, curved downward; side pieces strap-shaped, curved inward and a little upward, all pale testaceous.

Ethmia marmorea *Wals.*

In the male genitalia the anal plate is short without central spine, but a long, curved, hair-shaped one at each angle. The side pieces are short, curved inward with a strongly chitinized, finely dentate, black, angulated inner edge that is characteristic and conspicuous. None of the other species of the genus that I have seen have anything like this structure.

Ariz. (coll. C. V. Riley); Glenwood Springs, Col., Aug. 1–15 (Barnes); Huachuca Mts., Ariz., Aug. 8–15 (Barnes); Oregon (coll. Beutenmüller).

Ethmia semilugens *Zell.*

Anesychia multipunctella CHAMB.
Psecadia semiopaca GROTE.
Psecadia plumbeella BEUT.

Grote's description of *semiopaca* tallies exactly with specimens of *semilugens*. Beutenmüller's type of *plumbeella* is before me and is only a soiled specimen of normal *semilugens*; the plumbeous color is obviously not natural. In the male the anal plate is furcate, the spines separate, parallel, curved down, rather remote. Side pieces strap-shaped, curved inward and upturned, all pale testaceous.

Texas (coll. Beutenmüller); Kerrville, Tex., April (Barnes); Tex. (Belfrage).

Ethmia trifurcella *Chamb.*

I have not seen this species, but Mr. August Busck has made notes on the type which he has kindly loaned me. It is very much like the following, but with the color on lower half of wing pure white.

Ethmia semiombra, sp. nov.

Head and thorax pale gray, palpi with a black ring on second joint and two on the last joint; a brown dash on posterior vertex of head. Fore wing with the costal part brown, the internal part pale gray, dusted with brownish scales. Limiting line sharp, free of dusting scales, the brown thrice excavated, with a dot in the second and third excavations, that in the second small and before the middle, that in the third large and centrally situated. The brown color fades toward the costa, partially detaching three brown, rounded dashes in a curved line; a rounded apical patch of pale gray; a terminal row of dots. Hind wings and abdomen brown.. Expanse, 20 mm.

Two females, San Diego, Texas, June 12, 1895 (E. A. Schwarz); Brownsville, Texas, June 20, 1895 (C. H. T. Townsend). U. S. Nat. Mus., type No. 6623.

Ethmia hagenella *Chamb.*

The anal plate of the male appears to end in a single spine; side pieces broadly strap-shaped, very strongly curved upward, when closed, covering the end of the abdomen.

Texas (Chambers' type); Tex. (coll. Beutenmüller); Bennet Co., Tex., March 8, 1891 (Webster).

Ethmia apicipunctella *Chamb.*

I have not seen this species. Mr. Busck's sketch of the type shows it allied to *longimaculella* and *zelleriella*, but with more rounded, less elongated spots and apparently a different arrangement. The size is as in *coranella.*

Ethmia coranella, sp. nov.

Type of maculation of *longimaculella*, but the dash below cell, spot at end and dash beyond fused into a long bar that reaches the margin. Above this dash and below costal edge are six elongated spots, the last one a basal dash, reaching the costa at base; a spot on fold at base, three spots between fold and inner margin and a rounded one below the center of the long dash; a terminal row of dots. Hind wings white. Expanse, 18 mm.

Three males, Kerrville, Texas (Barnes); Shovel Mt., Texas, June 16–23 (Barnes). U. S. Nat. Mus., type No. 6624.

In the male the anal plate is short and ends in a single, downwardly curved spine, rather slender and pale colored. Side pieces convex, broad, rounded, excavate below with a brush of several stiff spines arising from the excavation and directed transversely.

Ethmia longimaculella *Chamb.*

Psecadia walsinghamella BEUT.

I have but one male specimen of this species and that has lost the abdomen. West Virginia (Beutenmüller's type); Kentucky (Chambers' type); Plattsburgh, N. Y., June 21 and 26, 1888 (Dyar).

Ethmia zelleriella *Chamb.*

Hyponomeuta texanella CHAMB.

I have no male specimen. Our only locality is Texas (Belfrage).

Ethmia texanella *Chamb.*

Ethmia chambersella DYAR.

Chambers described *Anesychia texanella* on page 179 of the Journ. Cincinnati Soc. Nat. Hist., Vol. II, and *Hyponomeuta texanella* on page 180. Both species prove to belong to *Ethmia* and the latter is a synonym of *E. zelleriella*, leaving the former, earlier name valid. In Bull. 52, U. S. Nat. Mus., I wrongly quoted the later *texanella* as page 2 instead of 180 (an error due to the use of the separately paged copy instead of the full volume and which escaped correction), which caused me to propose a new name for the earlier *texanella* supposing it to be later and invalid. I have a single specimen, without label, which I attribute to this species, but which may possibly not be the same. If not, the name *chambersella* can be used for it. It is white, dusted with brown scales, which form a dot in the cell, one at end of cell and a large one half way between these on the submedian fold; an indistinct submarginal powdering and terminal row of small dots. Expanse, 26 mm.; one female, in poor condition. U. S. Nat. Mus., type No. 6625.

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A NEW YPONOMEUTA.

By HARRISON G. DYAR.

Yponomeuta atomocella, sp. nov.

Palpi white, second joint with black dot, third black; thorax white, two black spots before on disk and two behind. Fore wing white with many black spots arranged irregularly in four longitudinal rows, confused beyond the cell and with a row of dots around the margin; fringe red-brown. Hind wings and under side uniformly red-brown. Legs white, fore legs largely black, middle tibiæ banded with black. Expanse, 18 mm.

Two specimens, one labelled "LeBaron," the other "Texas, coll. J. B. Smith." The first specimen is also labelled by Riley "*Psecadia atomosella* Riley MS." and another slip written by Zeller, October, 1871, stating that the specimen is, in his opinion, not a *Hyponomeuta* but a *Psecadia;* but in this I cannot concur. I am pleased, however, to adopt Dr. Riley's manuscript specific name. U. S. Nat. Mus., type No. 6614.

SLEEPING HABITS OF CERTAIN HYMENOPTERA.

By NATHAN BANKS.

The various means by which insects rest have been but little investigated. Occasional notes have been published, but often in connection with other matter, so that it is extremely difficult to collate the recorded facts. Since the Hymenoptera are among the most assiduous, as well as the most intelligent workers, it is natural that they should exhibit some interesting habits of sleep. The idea that the bee sleeps in the flower seems to have invaded literature at an early date. And there are a number of bees that commonly do remain in flowers (such as those of cucurbits and campanulas) all night. Whether this is a natural rest has not, I think, been considered, It may be that the insect remains, because, when ready to depart, it finds that it cannot see. The resting or sleeping habits of ants have been treated by various writers. That certain bees and fossorial Hymenoptera rest under peculiar conditions appears to have been known for many years, but I cannot trace out much literature on the subject. An article by Mr. E. A. Schwarz, referred to below, seems to be the most extensive paper published on this phase of insect sleep.

One July evening last summer, while engaged in wheeling the baby (another one this time) through some tall grass in the corner of my yard, I noticed an *Ammophila* attached to a grass-stem in the peculiar attitude shown in the accompanying figure. In a moment I saw another, and soon found that I had invaded the sleeping quarters of several dozen *Ammophilas.* While looking at various specimens I noticed two species of bees, which Mr. Ashmead (who has kindly named all the Hymenoptera) informs me are *Epeolus remigatus* and *Melissodes bimaculata*, attached to the grass-stems and evidently asleep. Although it was not yet dark these insects were easily caught by simply placing a vial over them. In walking around I discovered a specimen of *Myzine* fastened to the stem of a wild onion plant, in the manner described below. The *Ammophilas* proved to belong to two species, and on a later evening I took a third form. So that here were six species of Hymenoptera representing three widely separate genera using a small patch of grass as their sleeping quarters. Night after night I examined this patch and found the same species, although they gradually became less numerous, and the two bees entirely disappeared, owing, doubtless, to my capturing several and disturbing others by my unbecoming curiosity.

The Hymenoptera registering at the hotel were as follows:

Ammophila pictipennis Walsh, many specimens.

Ammophila vulgaris Cress., next in numbers.

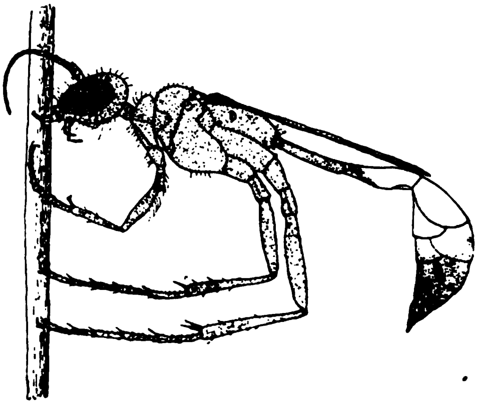
Ammophila urnaria Klug, two only observed.

Epeolus remigatus Fabr., three or four for several nights.

Melissodes bimaculata St. Farg., three or four for several nights.

Myzine sexcincta Fabr., one or two nearly every night.

The three species of *Ammophila* slept in the position figured. The mandibles grasped the grass-stem very tightly, yet in no case did they pierce the tissue. The wings were folded, one over the other, and the tip rested on the highest point of the abdomen. The legs were flexed at the femoro-tibial articulation, and rested on the grass stem. The hind pair of legs diverged at an angle of about 35° to 40°. In the evening the posterior abdominal segments moved back and forth in a telescopic way. But as the insect became sound asleep all motion ceased, and by 9 o'clock I could take a wasp off with my fingers and drop it in a bottle before it woke up. They came every evening between 7 and 8 o'clock and were gone before 5 o'clock in the morning. When a wasp came it did not at once attach itself, but flew about a while, often resting on the grass-heads or leaves. Frequently after attaching itself, it left to try some more suitable spot. They rarely



Ammophila pictipennis, asleep.

slept upon the grass-heads, but usually about one third the way to the ground. No particular direction was observed. Occasionally there was some variation, but not very prominent. Several times I observed an *A. pictipennis*, with the hind pair of legs extended backward. The position of the antennæ varied, but was usually as figured, one on each side of the stem. In no case did I find more than one specimen attached to the same grass-stem.

The two species of bees (*Epeolus* and *Melissodes*) bit into the grass-stem in the same way as the *Ammophila*, and all six legs clasped the stem, so that the head was up and the body close to the stem. In one case a *Melissodes* utilized a grass-leaf instead of a stem, doing so for several nights in succession. Only a few specimens were seen each night, and several were taken for identification. The abdomen of these bees pulsates in the same way as that of the *Ammophila*, until they are asleep.

The sleeping specimens of *Myzine sexcincta* were all males. Each was attached to the stem of a wild onion plant close to the seed-head; the venter upward, and the legs clasping the seed-head. The body was nearly horizontal, and the wings folded close to the abdomen. In one case a *Myzine* used an orchard grass head instead of wild onion. They were more shy than the other Hymenoptera, and it was several nights before I succeeded in taking one.

Why this particular set of Hymenoptera should select this patch of grass for their sleeping quarters is not evident to me. The patch in question was of about 100 square yards, irregular in outline, and traversed by a narrow path. There were very few flowers in the grass-patch; the grass was chiefly of two kinds, timothy and orchard, with plenty of wild onion intermixed. Beyond the fence was a field of rye which had been cut about a week before I had noticed the sleeping aculeates. Perhaps they had slept in the rye before it was cut. Near my yard on the other side were two large gardens. In view of what Professor and Mrs. Peckham have discovered regarding the habits of *Ammophila* in a bean patch, it may be that these wasps were busy during the day in the adjoining gardens and repaired at night to this patch of grass to rest and dream of big caterpillars. I examined many fields in the vicinity where there were splendid places for sleeping, but the wasps did not use them. I can only conjecture that one wasp, choosing its sleeping quarters, is observed and followed by others, until a certain place obtains a reputation for hospitality and seclusion. It will be interesting to discover if the same species of Hymenoptera will frequent the place another year.

My acquaintance with the inmates of this hostelry aroused a desire to learn more of the sleeping habits of other Hymenoptera, and excursions in the vicinity for that purpose were not unproductive, although I did not find another such aggregation of species. In a field not far distant there were many wild carrots or lace flowers in bloom. Every evening one could find a few specimens of *Bombus americanorum* clinging by its legs to the under side of the flower-head, back down. It did not use the mandibles. The specimens did not use any particular part of the field, but were widely scattered. Another evening, while destroying a rail fence in the search for Psocidæ, I came across a tiny male specimen of *Cerceris kennicotti* resting under a loose piece of rail. Later I found a few specimens of *Halictus ligatus* and *Odynerus conformis* asleep on grass-heads in an adjoining field. They were only for two nights, and were not in numbers.

Mr. Schwarz has kindly told me of a case observed by Mr. Barber and himself in New Mexico. At Las Vegas Hot Springs they saw five or six specimens of a bee, *Amegilla smithii* Cress., asleep and clinging by their mandibles to a grass-stem. It was on the 13th of August, and early in the evening, still light enough to collect. The specimens taken were all males.

When I began observations on these insects the paper of Mr. Schwarz was all that was known to me, and inquiry failed to develop anything further. However, I made several explorations into entomological literature which show that my observations are not new. Below I have brought together what I have found recorded, which may save others much search.

Mr. Schwarz in his paper, "Sleeping Trees of Hymenoptera" (Proc. Entom. Soc. Washington, IV, pp. 24–26, 1896), gives an entertaining description of the sleeping habits of several Texan bees.

Briefly, Mr. Schwarz found that upon certain trees, or rather large shrubs, a number of bees gathered nightly to sleep. He observed that these bushes differed in nowise from others nearby unused by insects. The species were *Melissodes pygmæus* and *Cœlioxys texanus*. They grasped the twig with all six legs, and the mandibles firmly inserted in the wood.

Mr. Cresson, in his paper on Hymenoptera Texana (Trans. Amer. Entom. Soc., IV, 1872, p. 201), states that Belfrage said that *Scolia* *lecontei* rests "during the night and chilly weather in clusters closely attached to the stems of grass and plants." Again in his paper on the Hymenoptera of Cuba (Proc. Entom. Phila., 1865, p. 88), Mr. Cresson says that Professor Poey informs him that *Melissa rufipes* "retires to a bush to sleep; it seizes a branch with its mandibles and places itself in a horizontal position, the back turned towards the ground." This resembles the habit of *Myzine sexcincta.*

Professor Cockerell (Ann. Mag. Nat. Hist., May, 1900, p. 413) records finding *Anthidium perpictum* "resting on stems of grass in dull weather."

E. E. Green (Entom. Mo. Mag., 1899, p. 214) says that a specimen of a bee, *Crocisa ramosa*, roosted for several nights on a twig. It clasped the end of the twig in its jaws, and slept soundly. The legs were folded close against the body, which is extended almost horizontally.

Saunders (Hymenoptera Aculeata of the British Islands, p. 308) says of *Chelostoma*, a bee: "The male usually spends its nights curled up in flowers, but Smith says that at other times he has observed them hanging to blades of grass by their mandibles 'suspending themselves in a horizontal position with their hind legs stretched out in a line with their bodies.'" Some of these were killed by chloroform and remained attached after death.

In the Proc. Cambridge Entom. Club, Oct. 9, 1874 (Psyche, II, pp. 40, 41), it is recorded that Mr. Scudder showed a specimen of "*Ammophila gryphus?* which rests at night by seizing a blade of grass with its jaws and holding itself extended either with or without the use of its middle and hind feet. * * * Many specimens were seen at different times acting in this manner." The specimen is figured in Morse's First Book of Zoölogy, p. 94, Fig. 91.

Mr. Mann, at the same meeting, said that in June, 1872, he found a wasp (*Odynerus?*) which had seized hold of the end of an oak twig with its jaws. It was just at sunset. Mr. Mann also called attention to a note by Mr. Sanborn in the Proc. Bost. Soc. Nat. Hist., XII, p. 98, upon an *Ammophila gryphus?* which was clasping a small oak twig with its mandibles and feet. He also called attention to a statement in Westwood's Modern Class. Insects, II, p. 136, where it is said that Latreille wrote that at night or during cloudy weather *Fœnus jaculator* "fix themselves by their jaws to the stalks of different plants."

There are doubtless other records, but sufficient has been given to show that various bees and fossorial Hymenoptera have curious sleeping habits. The exposed position and the use of the mandibles are very remarkable. That a bee or wasp can support its body horizontally all night by the jaws alone seems almost beyond belief. It would seem to indicate that their sleep is of an hypnotic sort. A great majority of the known cases are males. Where do the ladies sleep? Again why do different genera associate at the same hotel? Indeed the observations lead to dozens of puzzling questions whose solutions can only be found by future field observations.

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BORING NOCTUID LARVÆ.

By HENRY BIRD.

Self-preservation being one of nature's primary laws would incline us to believe that a boring, and consequently hidden larva, had selected a strategic position far ahead of the exposed feeders, and that we might expect to find them or their imagoes as predominating species. The act of boring doubtless dates back to the earliest larval conditions and with our Noctuids many still cling to this trait, though it is subject to various modifications. But when it comes to finding the imagoes of the more astute borers, at large in nature, we simply do not find them, and attention has to be directed to their larvæ, where more prolific results await us. Here there are many evidences at hand that would tend to disprove anv theories of a charmed or undisturbed existence, and a host of facts sufficiently divergent to interest us become apparent, so that hypothetical lines may be dropped to await a better information. Among the more important Noctuids belonging to the Agrotid and allied classes, a more or less universal habit of burrowing in the ground by day or seeking a similar seclusion under convenient objects, reflects perhaps a retention of ancestral propensities. Certainly one species, not far removed here, *Macronoctua onusta*, can claim distinction to being a full-fledged borer, and the heavy Noctuid pattern points back surely to an early type. Y t the larva shows a very full line of development and constitutes a good example of what we may expect of such conditions. A general information of this species seems lacking, which should not be, as it is widely distributed and common, if sought aright. Its discovery at Rye happened as one of those pleasant surprises which ever await the borer investigator and which, at the same time, often proves how much of our familiar surroundings are still in the dark to us. In the stalks, and later the roots, of *Iris versicolor*, these larvæ thrive, and although the fact had been chronicled by Dr. Thaxter years ago, the information seemed to have been overlooked and a later reference to "german lily" did not assist. The species is slow in maturing, running well through the summer in the completion of its larval stages and is afflicted by a more serious state of parasitism than any other known to us. The moth emerges in September (if your supply of larvæ were sufficiently numerous perhaps you can use the plural in speaking of your imagoes), and furnishes a striking if not handsome example of our native owlets. Its cylindrical, smooth, semi-translucent larva well represents what we have to expect of the true borers, for perforce they cannot have furry coats, nor humps nor horns, which help us so much in distinguishing some others. Such characters appear as of protective or repellant benefit and with the Heliothinii whose larvæ burrow in seedpods or capsules, in some of the few cases known, are colored and striped in such manner as to give protective results. What nicer mimicry can there be than the mature *Alaria florida* larva beside its partly consumed seed vesicle? If this larva has 'photographed the color of its surroundings," what can we say of the young Gortynæ who are the true aristocrats of the boring fraternity? Here the mature borers come under the conventional semitransparent class, but in early life shows contrasting colors in the form of longitudinal stripes which stop abruptly at its middle. It would look as though their ancestors may have lived within some encircling protection while the extremities were left exposed. The larva of the common bag-worm, shows, on its exposed thoracic joints, lines quite similar to those of the young Gortynæ and it is within bounds to believe the latter possess their's from a like exposure.

The Nonagrid and other partly aquatic forms working in reeds and water plants offer most interesting study and are in need of much further scrutiny. An unrecorded note of the extreme shortness of pupal stage, in *Nonagria oblonga*, may be favorable information of the species, as it is natural to desire quick realizations after the trouble of the breeding cage. From seven to nine days was the record of one brood, the new pupa shell with its great clypeal spur seems scarcely to get thoroughly hardened before the imago is ready to burst forth.

For an examination of tubercles and the specially developed protective plates, *Achatodes zeæ* furnishes a good delineation. A record of the species from the middle West, stating the pupa was formed within the burrows, when boring *Sambucus*, is quite the reverse of what occurs in this locality where the pupa is always formed in the ground.

After passing the representative borers there are still others that burrow or mine in their various food substances. Some, like *Scopelosoma*, only do so in their earliest stages.

Whatever attraction boring larvæ may have for the collector or student, one point worth remembering is the prevalent localization that necessarily exists with many of the species, so that unfamiliar territory will quite often disclose an unexpected guest, perchance some coveted rarity.

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DESCRIPTIONS OF NEW MALLOPHAGA FROM NEBRASKA.

By M. A. Carriker, Jr.

(Plates XX-XXII.)

For a number of years the writer has been greatly interested in the study of ornithology, and having in the meantime begun the study of entomology, he naturally became interested in the insect parasites of birds, namely, the group known as Mallophaga. In addition to the writer's own collection he has had access to that of the University of Nebraska and also to the private collections of Professor Lawrence Bruner and J. C. Crawford, Jr. I wish to express my thanks to the owners of these collections for their use and especially to Professor Vernon L. Kellogg, of Leland Stanford University, Cal., for his kindness in looking over the manuscript and drawings before publication, and for his helpful suggestions, most of which have been followed out. The types and co-types from which these forms were described are located as follows: In the University of Nebraska collection are types of *Nirmus trimarginis*, *Nirmus biocellatus* var. *nigropictus*, *Nirmus angustifrons*, *Colpocephalum quadrimaculatus*, *Nitzschia pulicaris* var.

tibialis, co-type *Akidoproctus kelloggi*. In the collection of J. C. Crawford, Jr., are the types of *Nirmus truncatus* var. *magnocephalus* and *Akidoproctus kelloggi*. In the collection of Professor V. L. Kellogg are co-types of *Akidoproctus kelloggi*, *Nitzschia pulicaris* var. *tibialis* and *Nirmus angustifrons*. In my own collection are types of *Docophorus cephalosus*, *Nirmus infrequens*, *Physostomum picturatus*, co-types of *Nirmus truncatus* var. *magnocephalus*, *Nirmus trimarginis*, *Nirmus biocellatus* var. *nigropictus*, *Nirmus angustifrons*, *Akidoproctus kelloggi*, *Nitzschia pulicaris* var. *tibialis*.

Docophorus cephalosus, sp. nov.

Female.—Body, length 1.55 mm., width .68 mm , deep smoky brown throughout with darker markings, body short, head large, wider than the abdomen, and tapering sharply to the narrow, truncate clypeus; abdomen nearly obscured by the deep chestnut lateral blotches.

Head, length .57 mm., width .72 mm.; wider than the abdomen, tapering sharply from the rounded temples to the comparatively narrow clypeus; front truncate, slightly concave; tip of clypeus colorless, with two short marginal and two dorsal hairs at the lateral angles; one short hair near the clypeal suture and two behind it; trabeculæ large, slightly curving and bluntly pointed; antennæ* short and stout, first two joints longest, remainder short and subequal; eyes prominent, obscured with brownish, with a short hair; a notch at the posterior angle of the eye; temples broad and rounded with two rather short pustulated hairs; occipital margin deeply concave; antennal bands heavy to the suture, where they are broken, then continuing to the clear portion of clypeus as narrow marginal bands; the posterior portions bend inward at the trabeculæ and meet over the mandibles; a short ocular band from base of antennæ to eye; temples narrowly margined with blackish-brown, shading inward; occipital bands slightly darker than ground color, running to base of the mandibles, where a curving branch is sent off to join the ocular blotch just before the eye; a transverse clear band just behind the heavy curving antennal bands.

Prothorax short, almost hexagonal, with a short hair at the posterior angles; heavy blackish-brown lateral bands; median portion slightly clearer than ground color of head. Metathorax about as long as prothorax; sides slightly concave, broadly diverging; posterior angles with two rather short hairs, posterior margin angulated on the abdomen, with a row of about nine pustulated hairs on each side; whole segment deep blackish-brown.

Abdomen short, nearly as wide as long, widest at third and fourth segments, thence tapering sharply to the tip; posterior angles protruding, with one hair in segments 1, 2, 4, and 9, the remainder with two; segments 1–7 with large deep smoky-brown lateral bands, completely covering the first segment and separated medially on the remainder by a narrow clear space; the posterior margins of the lateral bands with from six to nine short hairs arising from large clear pustules, eighth segment with a median lighter portion; ninth segment very small and rounded.

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*On account of the haste in the preparation of drawings the antennæ were omitted.

Legs short and stout, concolorous with head, with slight annulations at the tip of the femora and tibiæ.

The male differs from the female by being longer, the head narrower, the abdomen narrower, with sides subparallel and tip broadly rounded; the first segment of the abdomen is wider than the rest with sharply projecting posterior angles, the metathorax with a median clear portion, abdomen being completely obscured by the continuous lateral bands which on the first and second segments are pustulated as in the female but the remainder have not more than four small pustules, the suture between the eighth and ninth is clear, while the tip of the ninth is dusky with numerous small pustules; the genital hooks are very long, though not exceedingly heavy, extending from posterior portion of third segment to tip of abdomen.

It measures: body, length 1.67 mm., width .52 mm., head, length .56 mm., width .64 mm.

Several males and females collected from a Red-shafted Flicker (*Colaptes cafer*) shot at Lincoln, Neb., Nov. 3, 1900. This new form has little resemblance to any species of this genus yet described from any of the *Pici*. It is easily recognized by the short body and wide, abruptly tapering head.

Nirmus truncatus var **magnocephalus,** var. nov. (Pl. XX, Fig. 4.)

Female.—Length 1.7 mm., width .34 mm.; deep fuscous throughout, with darker margins on head, thorax and abdomen; head conical in front, broadly and squarely truncate; metathorax long and nearly parallel sided; abdomen subclavate.

Head, length .46 mm., width .31 mm.; front conical, broadly truncate, with sides straight and lateral angles of clypeus rounded and having five short dorsal hairs; two short dorsal hairs in front of the trabeculæ; ocular emargination deep; trabeculæ pale, pointed and equal to the first segment of the antennæ; antennæ slender, the second segment the longest, equal to the third and fourth combined, last three subequal and darker than the first two; eye prominent, convex, colorless, with a strong hair; temples flattened, narrowing posteriorly, with two long hairs; occipital margin slightly concave, narrowly margined with dark brown; a clear transverse band along the clypeal suture; antennal bands narrow, scarcely darker than the ground color of the head; a blackish blotch at the base of the trabeculæ; a larger and darker ocular blotch; temples narrowly margined with blackish, while the whole temple is a deep fuscous from the margin inward to the occipital bands, which are narrow, brownish, and terminate at the ocular blotch; mandibles chestnut; a lanceolate, fuscous occipital signature.

Prothorax quadrilateral; anterior angles and sides rounded; posterior angles with a long pustulated hair; anterior angles and lateral margins deeply bordered with brownish, which extends for a short distance around on the posterior margin; the coxal lines showing through plainly. Metathorax longer than prothorax, with a median, lateral emargination, and but slightly diverging sides; posterior margin transverse, with four or five long hairs having large pustules; lateral and posterior sides heavily margined with deep brown, almost a chestnut, while the whole segment is darker than the rest of the body.

Legs long, the two posterior pairs very stout, especially the femora.

The abdomen distinctly clavate, widest at the fifth and sixth segments, and bluntly rounded by the last three; posterior angles projecting, with one long hair, except the last three segments which have two; segments one to seven narrowly margined with blackish-brown, shading inward, and extending into the adjacent anterior segment; the spiracles showing as prominent clear spots just within the dark lateral bands; the interior portion heavily obscured by dark brown transverse bands, slightly clearer at the sutures and partially divided medially by a pale longitudinal line except on the eighth and ninth segments; ninth segment flatly convex and uniformly brown; a transverse row of about seven short, slightly pustulated hairs in the median portion of each segment except the last.

Four females collected from a Wilson's snipe (*Gallinago delicata*) (Ord.) by J. C. Crawford, Jr., Lincoln, Neb. and one female from a skin of Franklin's Gull (*Larus franklini*), which may have been a straggler. My specimens differ considerably in many details from Piaget's description and figure. The total length is about the same but the head is markedly larger, while the metathorax is nearly parallel sided instead of diverging, and on the whole if not deserving specific rank it is at least a well-marked variety.

Nirmus biocellatus, var. **nigropictus,** var. nov. (Pl. XXI, Fig. 1.)

Female.—Length 2.15 mm., width .6 mm.; pale, with bold blackish-brown markings on head, thorax and abdomen; the antennal bands together with the internal bands forming a clear parallelogram on each side of the head.

Head, length .51 mm., width .55 mm.; broadly parabolic in front and naked; temples parallel with one weak hair and two short bristles; occiput slightly concave. Antennal bands heavy, running forward to the margin of the narrow, clear oral groove, the posterior ends bending in at trabeculæ and meeting the broad brown occipital bands; narrower internal bands run forward from the bend of the antennal band, parallel to the sides of the head, to the margin of the oral groove then parallel to it to the end of the head, where they again join the antennal bands, forming a clear parallelogram on each side of the longitudinal oral groove; temples narrowly edged with blackish; a short ocular band joining templar and antennal bands; a brown, oval, occipital signature; trabeculæ short and uncolored; antennæ with first segment clear, the remainder broadly annulated with blackish.

Prothorax very short, margined laterally with blackish; a hair at the posterior angles. Metathorax short but broader than first segment of the abdomen; sides very broadly diverging; posterior margin angulated, with six weak hairs on each side; anterior angles with a dark blotch and posterior margin with a broad black band. Legs short, rather stout, femora and tibiæ broadly margined anteriorly with black.

Abdomen elongate oval, abruptly pointed posteriorly; posterior angles protruding, with one weak hair; segments with lateral blackish blotches extending inward one third the width of the abdomen, separated by broad clear sutures and narrowing and lightening inwardly; lateral blotches with two large, round, median clear spots, and connected on segments 1–5 by broad, brown transverse bands; a large brown median spot on segments six and seven, narrowing posteriorly; ninth segment with a small brown blotch on each side; a transverse row of short hairs along the middle of the segments, not reaching the lateral margins.

The markings of the male are identical with those of the female but there is a marked difference in size, the male being much the smaller.

Measurements of the male: body, length 1.77 mm., width .65 mm.; head, length .48 mm., width .47 mm.

Numerous specimens of both male and female were collected from the American Magpie (*Pica pica hudsonica*), at Ft. Robinson, Neb., Dec. 14, 1895, by W. D. Hunter.

These specimens are close to the species as described by Piaget from *Pica leucoptera*, and on account of the striking coloration might at first glance be taken for the original species. However they differ in size, in the width and intensity of the abdominal markings and the markings of the temples. The female was not seen by Piaget.

Nirmus infrequens, sp. nov. (Plate XX, Fig. 3.)

Female.—Length 1.45 mm., width .4 mm.; head elongate cordate with the peculiar V-shaped ocular bands common to these forms; thorax with lateral, marginal bands and metathorax with internal bands; abdomen with widely broken lateral bands and heavy median transverse bands; whole body clear except the head, which is pale brownish.

Head, length .46 mm., width .29 mm.; front broadly parabolic, one hair a short distance in front of the trabeculæ, which are very minute and colorless; eye slightly convex, with a very small bristle at the posterior angle; temples with one long hair and a short bristle; occiput slightly concave, naked, with a narrow dark border; no clypeal signature, but a clear oral fossa, expanding laterally as it approaches the mandibles; whole head narrowly bordered with blackish-brown, shading inwardly; antennal bands bending inward at trabeculæ for nearly one third the width of the head, then straight back to the margin at the eye, where it meets the heavy temporal band; a light brown shield-shaped occipital signature; antennæ with the first two segments longest and the whole uniformly brown.

Prothorax small, angles rounded; heavily bordered laterally with blackish-brown, the bands extending around on the posterior border, narrowing and nearly meeting on the median portion; a large clear pustule without hair in the posterior angles and a short weak hair. The coxal lines show through very distinctly. Metathorax about the same length as the prothorax but much broader; sides rounded and widely diverging; posterior border rounded, with six long hairs on each side; a dark spot in the anterior angles and a heavy irregular blotch extending inward from the posterior angles, narrowing and nearly meeting in the middle of the segment.

Abdomen subclavate, sides of posterior half nearly parallel and tapering abruptly at the eighth segment; the posterior angles projecting, nearly colorless and with one rather long and one short hair; eighth segment with hairs along the lateral and posterior margins; ninth segment naked; segments one to eight with a dark blackish-brown patch in the anterior half of the lateral margins and projecting anteriorly into the adjacent segment; internal clear portion obscured by heavy, median, transverse bands, separated by clear sutures except between segments six and seven, and seven and eight, where it forms a continuous patch, narrowing posteriorly to the border of the eighth, where it widens into a narrow crescent; transverse bands also separated transversely by pale transverse bands through their middle; ninth segment colorless, with a slight median emargination on the posterior border. Legs short and stout, brownish throughout, with slightly darker anterior margins.

One adult female and one immature female secured from one individual out of a large number of specimens of Lapland Longspur (*Calcarius lapponicus*), found dead at Wray, Colo., November 16, 1901, by Prof. Lawrence Bruner and Dr. R. H. Wolcott. These birds had been killed by flying against telegraph wires.

This form resembles in many respects Osborn's *picturatus*, but differs greatly in having the lateral bands of the abdomen reduced to brownish-black blotches in the anterior angles of the segments instead of a continuous band. As Osborn gives no measurements I am unable to compare it in this respect with his species.

Nirmus angustifrons, sp. nov. (Plate XXI, Fig. 2.)

Female.—Body, length 1.37 mm., width .32 mm.; body slender, head narrowly parabolic in front, dusky, with blackish linear antennal bands and V-shaped ocular blotches; abdomen subparallel with heavy median bands and lateral bands reduced to a dark spot in the anterior angles of the segments.

Head, length .32 mm., width .22 mm., pale brownish throughout; front narrowly parabolic, with one short hair in front of trabeculæ; ocular emargination slight; temples rounded, with one short hair; occipital margin slightly concave; trabeculæ uncolored, minute; eyes small, without hair; antennæ long, subparallel, segments 1, 2 and 5 subequal, 3 and 4 shorter, equal; antennal bands narrow blackish, submarginal, not reaching the tip of head; two linear blackish ocular blotches forming V-shaped marks on each side of head at the ocular emargination; margin of temples darker, shading inward; a clear oral fossa constricted midway from tip to mandibles, then widening abruptly to side of mandibles, which are large and deep chestnut; a small circular occipital signature; occipital bands pale.

Prothorax quadrangular, with angles and sides rounded; posterior angle with a very short hair; a broad submarginal band running around on the lateral and posterior sides, pale in its anterior portion, deep brown along the posterior transverse portion; a clear pustule without hair within the posterior angles.

Metathorax longer than prothorax, with sides rounded and broadly diverging; posterior margin angulated on the abdomen, with three long hairs on each side near the angles; a dark brown blotch in the anterior angles, and large, irregular, submarginal blotches running inward from the posterior angles; the whole thorax slightly tinged with brownish.

Abdomen large, sides subparallel, ground color of segments clear and translucent; posterior angles very slightly projecting, without hairs on first two segments; segments 3–6 with one hair; 7 and 8 with three, also four along the posterior margin of the eighth; lateral bands reduced to a deep brown spot in the anterior angles of segments

2–6; heavy, blackish-brown, median transverse bands in segments 1–8, much paler, however, in segments 1 and 2; all darker along the posterior portion and separated by a clear transverse band in the posterior portion of the segments; a narrow, clear, median stripe separates them longitudinally, except in the eighth segment; ninth segment small, rounded and slightly emarginate at the tip.

Legs short and stout, especially the femora; darker than the body, being the same color as the head with darker annulations and semi-annulations on the femora and tibiæ.

Numerous females collected from specimens of the Western Lark Sparrow (*Chondestes grammacus strigatus*), in the Little Bad Lands, Sioux Co., Neb., June 17, 1901.

This form seems to have little resemblance to any species hitherto described, and is easily recognized by the long, narrow, dusky head, the absence of lateral abdominal bands and the heavy, median, transverse, abdominal bands.

Nirmus trimarginis, sp. nov. (Pl. XX, Fig. 2; Pl. XXI, Fig. 5.)

Female.—Body, length 1.87 mm., width .61 mm.; head triangular, front narrowly truncate; prothorax short, quadrangular; metathorax short, with widely diverging sides; abdomen almost a perfect oval, narrowly margined with deep chestnut.

Head, length .5 mm., width .5 mm.; triangular, slightly swollen at trabeculæ; front sharply conical, with sides straight and clypeus squarely truncate; two short hairs just behind the lateral angles of the clypeus, one at the suture and one in front of the trabeculæ; trabeculæ slender, clear, bluntly pointed, and equal to the first segment of the antennæ; antennæ rather short and slender, first segment thickest, second longest, nearly as long as the last three combined, which are uniformly darker; eye small, scarcely perceptible, obscured by a blotch and furnished with a long stout hair; temples rounded, with two long hairs in large pustules, and several short bristles; occipital margin concave with the occiput slightly convex; the chestnut antennal bands narrow, broken at the suture and extending nearly to the lateral angles of the clear clypeus, while the posterior portion, bending angularly inward at the trabeculæ, passes backward to, and joins at the middle portion, the somewhat broken occipital bands; temples narrowly edged laterally with deep chestnut.

Prothorax short, quadrilateral, narrower in front, with the anterior angles flatly rounded and the sides nearly straight, but slightly diverging; posterior angles rounded, with one long hair; whole segment rather indistinctly margined with dull chestnut, while the coxal lines are large and plainly visible. Metathorax scarcely longer than prothorax, sides rounded and widely diverging; posterior margin angulated with several pustulated hairs on each side; a dark blotch at the anterior angles, and a broad band along the lateral margins, extending inward from the posterior angles.

Abdomen an almost perfect oval, slightly pointed posteriorly, widest at fourth and fifth segments; posterior angles projecting, with one hair, except on the first, eighth and ninth segments which have none; segments two to seven sharply and narrowly margined with deep, blackish chestnut, projecting into the adjacent anterior segments; the median portion slightly obscured by a continuous, fulvous, longitudinal band, fading gradually laterally; segments two to six with a median, narrow, dark brown, transverse band, slightly posterior to the middle portion of the segment; ninth segment bluntly pointed, clear, with a slight median emargination; a median transverse row of long hairs along the middle line of segments one to seven. Legs short, rather stout, concolorous with body and with narrow, broken chestnut bands along the anterior borders of femora and tibiæ.

The male differs considerably in several respects from the female. The head and thorax being paler, the sides of the metathorax straight (though diverging), while the abdomen is shorter and almost clavate; the genital hooks small and blunt while the whole body is much smaller than that of the female.

Measurements: body, length 1.4 mm., width .5 mm.; head, length .44 mm., width .44 mm.

One female, one male and three immature males collected from a Rocky Mountain Creeper (*Certhia familiaris montanus*), by Professor Lawrence Bruner at Harrison, Neb., Feb. 17, 1896.

This form resembles *gulosus*, described by Nitszch from *Certhia familiaris* (European form), and while his description is somewhat meagre, enough is given to distinctly separate it from this form.

Colpocephalum quadrimaculatus, sp. nov. (Plate XXI, Fig. 4.)

Male.—Body, length 1.17 mm., width .49 mm.; whole body pale, with blackish head and ventral thoracic markings in addition to the brownish spots and bands of the head, thorax and abdomen; abdomen with heavy lateral bands and median transverse bands nearly reaching the lateral bands and separated by clear sutures.

Head, length .27 mm., width .41 mm.; front broadly and regularly rounded beyond the anterior margin of the antennal fossæ; terminal segment of the palpi projecting; two short and two longer hairs in front between the palpi; one short one at the palpi; one short and one very long one just behind the palpi, and two long ones at the anterior margin of the antennal fossæ; anterior and posterior angles of the temples rounded; occipital margin deeply concave, with occiput slightly convex; eye undivided, nearly obscured by a black fleck; ocular fringe short and rather sparse for the genus; temples with four very long hairs, one short one and a bristle; mandibles small and pointed, blackish; a black blotch at the base of the palpi and along the inner margin of the antennal fossæ; a brownish band connecting the black blotches at the palpi; curving bands from the same point to the anterior angles of the occipital signature; occipital signature large and continuous with a median longitudinal band on the prothorax; a narrow, black, submarginal occipital border; whole head clear with the exception of the above-mentioned markings.

Prothorax hexagonal, wider than long, with rounded, protruding lateral angles furnished with a short bristle; sides converging posteriorly (but not quite as much as shown in the plate); a blackish blotch at the anterior angles, connected by a brown transverse band; a broad median longitudinal brown band, narrowing abruptly to a point near the posterior margin of the segment, and with narrow brown bands (not shown in plate) diverging from the point where the posterior constriction begins, to the lateral angles; a brownish marginal band fading posteriorly runs backward from the lateral angles; narrow, black, ventral bands (showing through from beneath) running from the lateral angles to the anterior angles, and from there backward to the posterior portion of the median, longitudinal band; coxæ visible from above. Metathorax large, with sides straight and diverging, posterior angles with one long and two short hairs; posterior margin rounded, with four long hairs; a circular brown blotch at the median portion of the anterior margin, projecting over into the prothorax; another larger, somewhat quadrangular blotch in the posterior median portion of the segment; the two posterior pairs of coxæ showing through very distinctly as black circular lines; narrow black bands on the ventral surface as follows: one long curving band from the anterior angles to the middle of the first abdominal segment; one along the anterior border from the angles inward to the border of the median circular blotch, then straight backward to the middle of the segment; lastly a transverse, intercoxal band from the middle of the curving lateral bands inward to the tip of the longitudinal band and then curving backward to the margin of the segment.

Abdomen oval, with posterior angles slightly projecting and furnished with one long and one short hair on segments one to four and six and seven; two short ones on segment five, two long and one short one on segments eight, and two long ones in the middle of the eighth segment, which has the appearance of being divided transversely; posterior margins of the segments slightly curving anteriorly, with a fringe of short, unpustulated hairs; lateral bands of segments dark brown, broad and slightly broken at the sutures; heavy, median, transverse bands, nearly reaching the lateral bands, and broken by clear sutures, except between the eighth and ninth segments; ninth segment large, longer than the others, with rounded posterior margin and darkened tip; genital hooks large and heavy, extending from the fifth segment to the tip of the abdomen.

Legs long and stout; femora swollen, especially the anterior pair, with several short hairs along the anterior margin; all with darkened base and tip and with a large clear pustule near the base (not shown in the plate on the two posterior pairs); tibiæ slightly swollen, and darkened at the tip, where there is also a clear pustule; a fringe of short hairs near the tip on the inner side; tarsi with the first segment short, the second long and stout; ground color of legs the same as body, a very pale testaceous.

A single male collected from an American Crossbill (*Loxia curvirostra minor*) at Warbonnet Cañon, Sioux Co., Neb., June 17, 1901. This is the first record of any species of *Colpocephalum* being collected from this host and the species is quite distinct, though it has a somewhat superficial resemblance to the general color and outline of *laticeps* Kell., but it is very readily recognized by the bold blackish bands on the ventral surface of the thorax, which show nearly as plainly from above as below.

Physostomum picturatus, sp. nov. (Pl. XXIII, Fig. 3.)

Female.—Body, length 2.9 mm., width .65 mm.; almost white, except a tint of golden on the prothorax and a few dusky median spots on the abdomen; with heavy blackish borders to the abdomen and thorax.

Head, length .67 mm., width .55 mm.; front slightly swollen laterally and flatly convex, without hairs; sides nearly straight from eyes to the swelling of the front; eye distinct, completely filling the ocular emargination; occipital angles acuminate nearly reaching the lateral angles of the prothorax, and with two slender weak hairs; palpi projecting beyond sides of head by nearly last two segments; a darker band across the clypeus just in front of the palpi, on which are five short, stiff, dorsal hairs; a short marginal hair at anterior end of antennal fossæ, and two short bristles on the anterior margin of antennal fossæ. Markings similar to *australe*, but narrower and connected by a dusky band; a black blotch bounding the inner side, only, of the antennal fossæ, there being merely a black line bounding the outer margin; margin of temples narrowly dusky; a narrow black occipital border, broken medially.

Prothorax hexagonal, angles rounded; lateral angles with one weak hair and two bristles; a heavy blackish-brown border laterally; two internal, parallel, brown lines longitudinally; bold black lines curving from lateral borders to anterior angles of metathorax; a long slender hair on posterior angles.

Metathorax longer than prothorax; light golden-brown; sides sinuated, with one slender hair at posterior angles. Anterior border and angles heavily banded with blackish, broken medially; submarginal lateral bands continuous with lateral bands of abdomen, and cut medially by a curving black band, from whose outer anterior margin runs a lighter brown band nearly to anterior margin of segment. Legs rather slender, concolorous with body.

Abdomen with nearly parallel sides, truncate anteriorly, with sharply marked, heavy, pitchy-brown marginal bands, extending to the end of the eighth segment; posterior angles with a single slender hair; vulva convex, margined with short hairs. A pale brown median blotch on fifth and sixth segments.

Two females from an Orange-crowned Warbler (*Helminthophila celata*), Lincoln, Neb. Resembles *angulatum* somewhat in the markings of the prothorax, but has the heavy lateral bands of the abdomen, marginal, as in *diffusum*, and is much smaller than either.

Nitzschia pulicaris var. **tibialis**, var. nov. (Pl. XXII, Figs. 4, 5.)

Female.—Body, length 2.5 mm., width .95 mm.; head, length .5 mm., width .66 mm.; front broadly rounded, with a slight emargination just behind the projecting palpi; temples angular before and behind, with four long, pustulated hairs; occipital margin emarginate, with occiput convex, having four pustulated hairs arising from within the narrow occipital band; palpi projecting by a portion of the third and the fourth segments; front, between the palpi, with four short hairs; one short and two long hairs on each side at the anterior margin of the antennal fossa; ocular fringe distinct; a dark band bordering the inner margin of the antennal fossa and passing around the temples; occipital bands parallel, running to the base of the mandibles; a short band running from mandibles to the margin at palpi; between the occipital bands is a quadrilateral, formed by narrow bands, with bands running from its anterior angles to the occipital bands near their junction with the mandibles, also bands connecting its posterior angles with the base of the occipital bands.

The prothorax hexagonal, lateral angles protruding and rounded, with one long hair and two short bristles; anterior margin sinuated, with a narrow marginal band;

submarginal lateral bands running backward from the lateral angles and paling posteriorly; a median transverse band connecting lateral bands and also a V-shaped internal band with its upper ends uniting with the lateral bands near the anterior angles. Metathorax longer than prothorax; the suture between the meso- and metathorax plainly visible both on the dorsal surface and at the lateral margins; posterior margin slightly angulated, with a fringe of short hairs; whole segment dusky with darker anterior and lateral, marginal bands; posterior angles with two rather long hairs.

Abdomen large, oval, slightly inclined to be clavate; segments subequal, with slightly projecting posterior angles having three hairs of different lengths, except in the first and ninth segments, which have but two; segments one to eight with heavy lateral bands, slightly clearer at the sutures, and the posterior margins with a fringe of short, unpustulated hairs; ninth segment much narrower, quadrate, and with the posterior portion clear and fringed with fine hairs; whole interior of abdomen evenly dusky, not broken at the sutures.

Legs long and slender, except the front femora, which are greatly dilated, being almost orbicular; first and second pairs of femora with several short hairs on the anterior and posterior margins; posterior femora with a submarginal row of fine hairs along the anterior side for nearly the entire length of the segment; tibiæ with a few short hairs along the margins and with dark, slightly broken, borders to the two anterior pairs; posterior tibiæ very slender, parallel-sided, and without marginal markings; first joint of tarsi short, second long and stout.

The male is much smaller than the female; head not quite so broad in front; abdomen oval; the hairs of the posterior angles much shorter, except on the fourth, seventh, eighth, and ninth segments, where they are extremely long; the posterior femora are as long as in the female, and more swollen; the posterior tibiæ are twice as long as the two anterior pairs, being as long as in the female, swollen apically and heavily margined with deep brownish, slightly broken near the tip; the genital hooks are long and slender, reaching from the middle of the fifth segment to the tip of the abdomen.

The male measures: body, length 1.96 mm., width .75 mm.; head, length .45 mm., width .61 mm.

Four males and one female collected from two individuals of the White-throated Swift (*Aeronautes melanoleucus*) at Warbonnet Cañon, Sioux Co., Neb., May 30, 1901. It resembles *N. pulicaris*, and differs chiefly in the absence of the darker transverse, abdominal bands and the pustules of the dorsal, abdominal hairs.

Trinotun conspurcatum *Nitzsch.* (Plate XXI, Fig. 3.)

This species resembles *T. luridum*, but is easily distinguished by the darker background, the larger size, the narrower, clear, transverse bands at the abdominal sutures, and especially by the fact that the dorsal hairs of the abdomen arise from large clear pustules which is *not* the case in *luridum*.

My specimen measures: body, length 5.37 mm., width 1.8 mm.; head, length 1.07 mm., width 1.50 mm.

A single female collected from a whistling swan (*Olor columbianus*) shot at Nebraska City, Neb., Nov. 22, 1900. This specimen agrees very closely, indeed, with the excellent description and plate which Piaget gives, the only appreciable difference being in the slightly smaller size. Although his figure could hardly be improved upon, a drawing of my specimen is given for the benefit of those to whom Piaget's plate may not be available.

Akidoproctus *Piaget.*

The following is a somewhat condensed form of the generic description as given by Piaget: The clypeus of great width with an indentation in the place of the signature of the *Docophori;* clypeus not distinct; the antennal fossa shallow and not extending in front of the trabeculæ; the antennæ almost uniform in the two sexes, short and thick, the segments decreasing in size to the tip; eye projecting, without hairs,* the temples long, rounded behind, with some weak bristles; occipital bands distinct, parallel.

The prothorax subquadrangular; metathorax wider than the head (except in *marginatus*), acuminate on the abdomen; the legs similar to *Nirmus* except greater length, especially of tibiæ.

Abdomen elongate-oval, naked except at the angles, with a large transverse furrow between the segments and the bands separated by a median, longitudinal, clear line; the last two segments, sharply separated from the seventh, form a small cone partly truncate or rounded (♂), pointed or rounded (♀); the genital organs of both sexes similar to *Nirmus*. The individuals are rarely met with and so far only on palmipeds, except *bifasciatus* which has probably straggled to a *Dromias ardeola*.

This genus has heretofore been found only in Europe and the finding of specimens of it upon a Canvasback Duck (*Aythya vallisneria*), at Lincoln, Neb., was quite a surprise. The specimens were collected by J. C. Crawford, Jr., from a bird killed by J. S. Hunter, and kindly turned over to me by Mr. Crawford for description.

The first species of this genus recorded was described by Nitzsch

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* This statement is either an error or else not a generic character, because the species which I have described has a very strong hair on the dorsal surface of the eye.

and placed provisionally by him under the genus *Lipeurus*. Burmeister placed it under *Nirmus* and Giebel followed his example; thus it remained for Piaget to create a new genus for it, and other species of the same type described by him. This he did in his Les Pediculines. Of the genus, he says: "Since there has been added to the unique species described by Giebel three and probably four new species of the same type, I do not hesitate to establish for them the genus *Akidoproctus*, of which the distinctive characters are: The indentation of the clypeus, the existence of a second internal band on the abdomen and the conical form of the last two abdominal segments."

Akidoproctus kelloggi, sp. nov. (Pl. XXII, Figs. 1, 2.)

Male.— Body, length 3.5 mm., width .8 mm.; whole body pale testaceous with black and varying shades of brown markings on head, thorax and abdomen.

Head, length .76 mm., width .64 mm.; elongate cordate, rather broadly rounded in front with six short bristles on each side between the trabeculæ and the clypeal notch; one short bristle on each side just within the opening of the notch; temples with one weak hair and five short bristles; occiput deeply concave, slightly sinuated and naked; eye prominent, convex, colorless, and, contrary to Piaget's generic characterization, has a large stiff bristle upon the dorsal surface; antennæ with the second segment longest, each segment semi-annulated with darker testaceous; a dusky spot on each side of the clypeal notch; a heavy reddish-brown band across the dorsal surface, joining the trabeculæ and passing over the mandibles; a blackish ocular blotch and another of the same color at the base of the antennæ on top of the brown transverse band; occipital bands heavy at base and blackish, narrowing and fading to the base of the mandibles; a pale, somewhat crescent-shaped clypeal signature.

Prothorax short, quadrilateral, with rounded angles, and convex sides; anterior angles with a blackish-brown, submarginal blotch joining the base of the occipital bands; a lateral submarginal band of the same color, passing around on the posterior borders for a short distance where it is joined by the lateral metathoracic band; the brown coxal bands showing through very plainly. The metathorax longer than prothorax and nearly twice as wide; sides rounded and widely diverging; posterior margin sharply angulated with a few weak bristles; a pair of long hairs at the middle on each side and three at the posterior angles; heavy black lateral bands separated from the black lateral abdominal bands by a clear space; the brown coxal lines showing through very plainly.

Legs short, rather slender, concolorous with body and with blackish tarsi and tips of tibiæ.

Abdomen elongate-oval, constricted posteriorly and widest at the second segment; lateral margins of each segment convex, more so posteriorly; heavy black lateral bands widely broken by clear sutures; posterior angles scarcely projecting, with two or three short hairs; a longitudinal, clear, submarginal band parallel to the black lateral bands; remainder of abdomen pale fulvous; segments one to seven with a darker, quadrilateral spot on each side of the median line, not touching the posterior margin of the segment, and each, in the first three segments, containing a still darker crescent-shaped band opening outward; in segments four to six, a median, transverse, blackish-brown band, widening laterally to the width of the segments; eighth segment with a median dusky spot and the lateral band extending inwardly along the posterior margin; ninth segment almost completely blackish-brown, with a small median, terminal emargination and two hairs on each side; the genital hooks are rather small, extending from the posterior margin of the sixth to the posterior margin of the eighth segment.

The female differs considerably from the male, especially in the markings of the abdomen. The abdomen is without the marked constriction posteriorly, widest at the third segment; without the median bands on segments four to six; the legs are stouter; the sixth and seventh segments of the abdomen have a continuous median blotch, while the ninth is more pointed and clear in the median portion; the lateral bands of the eighth segment are very narrow. Measurements as follows:

Body, length 3.65 mm., width .72 mm.; head, length .77 mm., width .65 mm.

Five males and one female collected from a Canvasback Duck (*Aythya vallisneria*), shot at Lincoln, Neb., March 25, 1901. Piaget's *bifasciatus* resembles this new form more than any other species of the genus, but it differs in the shape of the abdomen and thorax and in the abdominal markings.

EXPLANATION OF PLATES.

PLATE XX.

Fig. 1. *Docophorus cephalosus*, sp. nov. (♀.)
Fig. 2. *Nirmus trimarginis*, sp. nov. (♀.)
Fig. 3. *Nirmus infrequens*, sp. nov. (♀).
Fig. 4. *Nirmus truncatus*, var. *magnocephalus*, var. nov. (♀).

PLATE XXI.

Fig. 1. *Nirmus biocellatus* var. *nigropictus*, var. nov. (♀).
Fig. 2. *Nirmus angustifrons*, sp. nov. (♀).
Fig. 3. *Trinoton conspurcatum* Nitz. (♀).
Fig. 4. *Colpocephalum quadrimaculatus*, sp. nov. (♂).
Fig. 5. *Nirmus trimarginis*, sp. nov. (♂).

PLATE XXII.

Fig. 1. *Akidoproctus kelloggi*, sp. nov. (♂).
Fig. 2. *Akidoproctus kelloggi* (♀).
Fig. 3. *Physostomum picturatus*, sp. nov. (♀).
Fig. 4. *Nitzschia pulicaris* var. *tibialis*, var. nov. (♂).
Fig. 5. *Nitzschia pulicaris* var. *tibialis* (♀).

NOTES ON THE NOTONECTIDÆ OF THE VICINITY OF NEW YORK.

By J. R. DE LA TORRE BUENO.

In the spring of this year (1902) chance led me to attempt the breeding of Notonectas, and since that time I have collected them all through the summer in this vicinity, principally on Staten Island. On two occasions I collected in Van Cortlandt Park; and in the spring I got a good deal of material in the lake at 100th Street, in Central Park. In working up this material, I found that I had all the described species that occur in the East, with one exception.

In the genera *Plea* and *Anisops*, I collected what, because of locality, I take to be the only species found here; namely, *Plea striola* and *Anisops platycnemis*. As far as records go, *striola* appears to be the only species of *Plea* found in the United States, but it would seem to me that careful collecting and study would in all probability result in the addition of species to the list in this and the next genus. In *Anisops*, Uhler gives only one species as found in the Atlantic States, that being *platycnemis*.

The genus *Notonecta* is represented by *insulata*, *undulata* in three color-varieties; *variabilis*, and *irrorata*. I also took on Staten Island one specimen which does not very well fit in anywhere and may be an aberrant *undulata*, or a new species. This requires further study.

The analytical tables are adapted and the descriptions (except those of *Plea* and *Anisops*) taken from Mr. G. W. Kirkaldy's "Revision of the Notonectidæ," according to which I have made all my determinations.

For the proper understanding of the descriptions and tables, three terms must be explained. Kirkaldy says in his paper mentioned: "That portion of the head which is apparent from a dorsal aspect is named the notocephalon; it is more or less constricted close to the base, this constriction, here termed the synthlipsis, being of great convenience for diagnostic purposes. The imaginary anterior margin of the notocephalon is called the vertex."

ANALYTICAL TABLES.

Family NOTONECTIDÆ.

Beak 3-4-jointed; antennæ 4-jointed; first pair of legs inserted on the posterior margin of the pronotum; scutellum large.

CHARACTERS OF SUB-FAMILIES.

1 (2) Hind tibiæ and tarsi ciliated; abdomen with keel, hairy; eyes very large, conspicuous...**Notonectinæ.**

2 (1) Hind tibiæ and tarsi not ciliated; abdomen neither keeled nor hairy. Rostrum 3-jointed; eyes small, inconspicuous.......................................**Pleinæ.**

Sub-Family NOTONECTINÆ.

Genera.

Eyes not contiguous at base, posterior femora not reaching the apex of the hemelytra.

Pronotum not exceedingly transverse; wings present; hemelytral area distinct.

1 (2) Last segment of the antennæ much shorter than penultimate; hind tarsi without claws...**Notonecta** *Linn.*

2 (1) Last segment of the antennæ much longer than the penultinate. Hind tarsi with claws...**Anisops** *Spin.*

Genus NOTONECTA.

Species.

1 (2–3) Base of the pronotum twice its length; sometimes only one and one half times as long. (In the majority, twice as long.) Scutellum slightly shorter than metanotum.

2 (3) Vertex five times the width of the synthlipsis..................**uhleri** *Kirk.*

3 (2) Vertex less than five times as wide as synthlipsis.

4 (5) Lateral margins of the notocephalon nearly straight and nearly parallel.

Length of body not less than 13 mm. Dorsum abdominis more or less red.
insulata *W. Kirby.*

5 (4) Lateral margins of the notocephalon more or less curved, not at all parallel.

6 (8–10) Large robust species more than 12.5 mm. long.

7 (9) Vertex at least three times as wide as synthlipsis.

Head short, eyes somewhat large, lateral margins of the pronotum not quite straight...**irrorata** *Uhler.*

8 (6–10) Small species, less than 12 mm. long.

Pronotum twice or nearly twice as wide as long..................**variabilis** *Fieber.*

9 (7) Vertex less than two and one half times as wide as synthlipsis.

10 (6–8) Small species, subrobust.

Base of the pronotum nearly straight.................................**undulata** *Say.*

Plea striola *Fieb.*

Head large, wider than pronotum. Eyes small and set far apart.

Pronotum and metanotum fused, large, about four times as large as head, and overlapped at the base by the hemelytra.

Hemelytra coriaceous throughout, with no distinction of cells; reticulated and with a setigerous puncture in each reticulation from which springs a long fine seta. Strongly convex, making the body thicker through than the width. Alæ absent. Pedes all provided with claws; posterior tibiæ and tarsi furnished with sparse, searcely noticeable, swimming ciliæ.

Venter abdominis without a keel ; connexivum sparsely ciliated.

Color throughout bruno-testaceous, ranging in shade. Length, 2–2.4 mm. ; width, 1.1–1.2 mm. ; height, 1.3 mm.

This interesting little species I first found in Van Cortlandt Park, on September 13 of this year. I discovered it in washing the copious rootlets of a species of Duckweed, and took it at first to be a very large *Daphnia*. On looking more closely, I saw it assume the typical notonectid position, abdomen up, its extremity at the surface. Later in the season, toward the end of October, in company with Mr. W. T. Davis, we found it in Cape Henlopen Pond in Staten Island.

Two of the Pleas are now living in a covered glass with some *Nitella* to aërate the water, together with an agrionid nymph and an ephemerid nymph. To feed them there are plenty of water fleas. I have not seen the Pleas eat these, nor is their number apparently diminished, and from observations I am inclined to believe that they are vegetable feeders. I cannot, however, assert positively the nature of their food. Their favorite position seems to be clinging to the underside of the duckweed leaves. They rarely swim, apparently preferring to creep along the stems of the aquatic plants, on which at times they rest, clasping them with the legs. When they do swim, they move through the water by means of a rather rapid, clipping stroke.

When living and seen in the water, by means of a one-half-inch lens, the hairs arising from the punctures on the hemelytra, can be seen standing out ray-like, the punctures themselves being noticeable. Because of the highly convex dorsum, homogeneous character of the hemelytra and their habit of creeping along the stems of the water-plants, they might at a cursory glance be taken for small aquatic beetles.

Those I have collected were found along the edges, among the fine roots of the grasses and the stems of the netted water weeds, and from the habit of creeping noted, it might seem that this is their favorite habitat.

The places mentioned are the only localities for it that I know of in this vicinity, but *Plea* should be found anywhere. Uhler in his "Check List" gives this species as being found in the United States. Probably it is not oftener collected on account of its inconspicuous size and retiring habits.

Notonecta insulata *Kby.*

"*Head:* notocephalic lateral margins fairly straight and nearly parallel, very slightly constricted near the base ; *vertex* little wider than synthlipsis, which is about one fourth less than the width of the base of the eye. Lateral and humeral margins of the pronotum sinuate. *Scutellum* varying slightly in length, but occasionally reaching and usually nearly reaching the base of the metanotum, black. *Hemelytra* variable in pattern and color.

"*Alæ*: basal nervules crimson, the others yellow brown. *Pedes*: coxæ black, intermediate tibial spur small, slender, not tipped with black. *Abdominis dorsum*: segment 1 black, 2–6 brilliant scarlet, 7–8 reddish testaceous. *Abdominis venter* black, connexivum and central carina green. Long., 13–15 mm.; lat., 4.9–5 mm."

Personally, I have not found this species, but Mr. H. G. Barber has taken it in the city, in a rock-hole that was being drained; and Mr. Davis has found it on Staten Island. It might at first glance be taken for *undulata* var. *charon*, but is readily distinguishable from it by the nearly parallel notocephalic margins, the greater size, and the reddish tinge of the hemelytra.

Notonecta undulata *Say*.

"*Head* diverging curvedly (varying in degree) from the synthlipsis, which is about two fifths the width of the vertex. *Pronotum*, humeral margins as a rule not distinct. *Scutellum* not quite one fourth shorter than the metanotum, varying in color from pale luteous to black, with divers intermediate arrangements of the two colors; similar hemelytral markings occurring with dissimilarly marked scutella and vice versa. *Metanotum* varying from luteous to black, with three or more dark castaneous stripes, scutellar margin luteous. *Hemelytra* exceedingly variable, giving rise to a number of well marked varieties, though these are linked by intermediate forms. Long. 10.2–12.6 mm.; lat. 3.4–4.2 mm."

This species is represented in three varieties in this locality. The pure moonlight-color or very pale greenish-yellow variety, *maculata* Fieb., which occasionally exhibits a few dark markings, grades into the next variety, *undulata* Say. The latter varies from pure ivory-white to pale luteous, with a somewhat greenish-gold tinge in some specimens. It is marked with from a few indefinable brown spots at the base of the membrane to a broadish band, covering the base of the membrane and the apex of the corium. The third variety, *charon* Kirk., resembles the more heavily-marked specimens of the preceding with clouded hemelytra. As a matter of fact, these three varieties merge into each other by insensible gradations, and it is only in a large series that this can be appreciated.

The majority of the light specimens I have were taken in Central Park, from about the middle to the end of March. A few were collected this fall in Staten Island with Mr. Davis. The darker varieties all came from Staten Island and were collected in October and November.

The locality they frequent in the Park (and where they were abundant) is a small lake full of vegetation. I found them among the past year's dead leaves in a little cove which was later massed with vegetation. This place was teeming with agrionid nymphs, which furnished them abundant food.

In Staten Island a few were found in Cape Henlopen pond; they were, however, much more abundant in the vegetation in the rock-pools of an abandoned quarry. The temperature of the water was, of course, low, because of the season, and the insects seemed to be seeking shelter among the vegetation.

The specimens taken in the spring bred in my aquaria, but unfortunately I was unable to take them beyond the third instar. From the size of this nymph and of others that I have collected, it might seem that there are at least five instars, if not six.

This is by far the most common species locally and can be found without any difficulty.

Notonecta variabilis *Fieb.*

"*Head:* notocephalic lateral margins diverging curvedly from the narrow base, vertex about three times as wide as synthlipsis. *Pronotum:* width of posterior margin not quite twice as great as the length of the pronotum. *Hemelytra:* very variable. *Alar* nervures pale golden yellow. *Pedes* and abdomen as in *N. undulata* Say. Long. 8.9 to 10 mm.; lat. 3. to 3.4 mm."

This interesting species I first took on the Palisades, one specimen only. On election day (November 4) of this year, I collected it in large numbers at Van Cortlandt, and found it clinging to the under surface of dead leaves in the water.

It looks very much like a small specimen of *N. undulata* var. *maculata,* but the size and the notocephalon serve to determine it. The largest *variabilis* I have measured is only 10 mm., while the shortest *undulata* var. *maculata* exceeds 11 mm.

This species has also been taken in Staten Island by Mr. Davis and myself.

It is of interest to note that on one specimen of this I found a parasite, fastened to the dorsum of one of the abdominal segments. I shall describe this later.

This species is in part *N. varibilis* Fieb., and is considered by Professor Uhler to be a variety of *undulata.* As stated before, I have accepted Kirkaldy's classification, and on comparison of characters, it would seem to me that his differentiation of species is good.

Notonecta irrorata *Uhl.*

"*Head* small, notocephalic lateral margins diverging widely, vertex a little more than three times as wide as synthlipsis; width of vertex and of the eye subequal; *eyes* rather larger proportionately than some other species; *pronotum* much wider basally than apically, lateral margins not sinuate, humeral angles acute, humeral and posterior margins sinuate. *Hemelytra* rich black, irrorated (especially on the clavus) with refulgent yellow-brown, interior lobe of membrane and apex of exterior lobe smoky. The irrorations vary greatly in different individuals; in some the corium and membrane are almost immaculate, in others the whole of the clavus and corium is irrorated, imparting a checkered appearance, while in others the clavus is rich (almost metallic) yellow-brown with faint distant, narrow black lines. *Alar* nervures brown. *Pedes*: intermediate tibial spur small. *Abdominis dorsum*: first to fifth segments black; sixth, seventh and eighth sordid grayish-brown. *Abdominis venter* black. Long. 13–14 mm.; lat. 4–4.5 mm."

This species has been found in the Park lakes by Mr. E. B. Southwick; Mr. Barber has found it in company with the *insulata* before mentioned; and Mr. Davis and myself on Staten Island. We found it in a pond shaded by trees and surrounded by vegetation, matted with decaying roots; fallen leaves and limbs, and aquatic plants were mixed in the black water. It was fairly abundant there.

This cannot be confused with any of the other local species. Its dark color, small head and chunky shape will at once serve to distinguish it.

Notonecta uhleri *Kirk.*

"*Head*: notocephalon in the form of an inverted wine decanter, margins greatly curved, widely diverging toward the vertex, which is six to eight times wider than the synthlipsis at which point the eyes are almost contiguous. *Pronotum*: humeral angles acute, accentuated, lateral margins sinuate, humeral margins little separated from the posterior margin. *Metanotum* dark purple-brown. *Hemelytra* varying from dark brick-red to rich orange yellow; a large, irregular blotch at the base of the corium extending transversely and non-acuminately from the apex of the clavus to the golden-yellow exocorial lateral submargin; membrane dark red-brown, apically black—this tint encroaching more or less basally. *Alar* nervures brown. *Pedes*: coxæ blackish; intermediate tibial spur blunt, subcylindrical. *Abdominis dorsum*: first and second segments rufo-testaceous, deeper marginally, the remainder flavo-testaceous, lurid marginally; this latter tint encroaching inwards more and more apically. *Abdominis venter* rufo-testaceous, densely provided with greenish-black ciliæ. Long. ♂ 11–11.4 mm., ♀ 12 mm.; lat. ♂ 3.5–4 mm., ♀ 4 mm."

This I have no knowledge or record of in this vicinity, but as it occurs in Massachusetts and also in Florida, it may perhaps be found here.

Anisops platycnemis *Fieb.*

Head rather large, with prominent eyes, notocephalic lateral margins slightly diverging from synthlipsis and again converging toward the vertex ; to the naked eye, the notocephalon appears of equal width throughout. Pronotum overlapping base of head somewhat pointedly, and terminating in a point at the meeting of the hemelytra. Metanotum completely covered by the hemelytra. Hemelytra pearly, lustrous, varying in color when closed from pure white through a bluish to a blackish tinge, in this respect resembling strongly the shadings of mother-of-pearl. Alar nervures pale ; Alæ hyaline. Abdominis dorsum varying from testaceous base and blackish tip to nearly entirely black. Venter black. Pedes testaceous. Long. 6.7–8.1 mm.; lat. 2–2.3 mm.

This species I have taken only in Staten Island with Mr. Davis, where we found it in large numbers in a rock hole in an abandoned trap-rock quarry, on October 25. Its slim, long shape was seen at different depths with its long sweep-like hind legs ready for a swift stroke, floating motionlessly among the algæ. We took a large number of specimens on this occasion and a subsequent one.

This species can be readily distinguished from the local species of the genus *Notonecta* by its rather long and slender shape, its narrow notocephalon with parallel sides separating the large eyes ; and by the beautiful pearly luster of the hemelytra, which vary from a pure white to a blackish tinge, according to the color of the dorsum abdominis.

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NOTES ON THE CICINDELIDÆ OF THE PINE BARRENS OF NEW JERSEY.

By Charles W. Leng, B.S.

The following notes are prepared from the collecting experiences of Mr. Edw. D. Harris, Mr. William T. Davis and the writer, who have, separately or together, visited the pine barrens in each month from April to October. The point visited has usually been Lakehurst (formerly called Manchester), situated about seven miles south of Lakewood and in the midst of a typical pine barren country, where sand, stunted pines and dwarf oaks are repeated with little variation mile after mile ; other excursions have been made to Jamesburg, which is rather on the edge of the pine barren than in its midst, and Brookville, which was selected for its propinquity to the East Plain, the most extremely barren portion of the pine barren. On the East Plain, away from the streams, the tallest tree rises four feet above the ground and the usual elevation of the pines is about eighteen inches.

Throughout the Pine Barrens the conditions are suitable for Cicindelidæ; the roads are sandy, the trees are far apart and the soil in which they grow is nearly pure sand, and extreme dryness prevails everywhere except in the immediate vicinity of the streams and the white cedar swamps which often border them. On the East Plain, the sand is mixed with pebbles, not universally, but quite generally. The genus is represented by an extraordinary number of species and individuals of which the following is a list as far as they are known to me:

Cicindela unipunctata *Fab.*

One specimen was taken by Mr. Harris at Lakewood, June 22, on a path running through the pine woods.

Cicindela modesta *Dej.*

This variety is very abundant on sandy roads from the earliest warm days in the spring until about the end of June. In midsummer it cannot be found in numbers and we have no records of its capture between July 4 and August 29, although the locality was visited July 29. It occurs again in September in considerable numbers and some individuals probably hibernate and reappear in the spring.

It has been found at all the places visited and the exact dates of capture are April 10, April 15, May 24, June 4, July 4, August 29, September 2, September 22.

Cicindela rugifrons *Dej.*

This species occurs with the preceding but less abundantly. The earliest date on which it is recorded is April 28, the latest date is October 21.

A comparison between the Pine Barren specimens of this species and those found at Aqueduct, Long Island, by Mr. Louis H. Joutel and Mr. Davis, shows some minor differences which might be expected to result from the long period of time during which there can have been no communication between these two branches of the species. The Long Island specimens, for example, vary in their markings much more than the New Jersey specimens and even immaculate individuals have been found. Apparently the influence of isolation can be traced in these differences.

Cicindela consentanea *Dej.*

This species occurs sparingly at Lakehurst and more abundantly at Brookville. At Lakehurst it is found in open spots in or at the edge of the woods and seems to prefer the blackened ground which it resembles in color. The exact dates on which it occurs are April 28, May 24, June 4, September 4, September 22. The burnt ground between the railroad track and the woods about a mile north of the station at Lakehurst is one locality where it may be found.

Cicindela purpurea *Oliv.*

This species occurs at Lakehurst from April 10 to May 24, in the less sandy soil east of the railroad, and again from September 3 to October 21. It has not been found in the pure sand roads west of Lakehurst and we have no record of taking it in June, July or August. It was found also at Brookville on September 22.

None of the varieties of this species has been found associated with it.

Cicindela generosa *Dej.*

This species occurs in numbers at the same dates and in the same localities as *modesta*.

Cicindela vulgaris *Say.*

This species occurs in the greatest abundance at the same dates and in the same localities as *modesta* and *generosa*. It has been found as late as October 21. The specimens are not as uniform in markings or size as those of the preceding species and there is an approach, especially in some specimens from the East Plain, to the small dark form that occurs in the Southern States.

Cicindela repanda *Dej.*

This species occurs on damp sand near the water, where the roads cross the streams, and in the cranberry bogs, and is locally abundant. We have found it in April, June, July, August, September and October and apparently the fact that the home of the larva is near the water, in moister ground, permits some individuals to complete their transformation earlier than is possible in the case of those species whose home is in the dryer sand. In Louisiana, Mr. Coverdale noticed the appearance of Cicindelæ after a copious rain in the fall ; and I should think that the earlier reappearance of *repanda* was certainly due to a similar cause.

Cicindela 12-guttata *Dej.*

This species has been found in small numbers at Lakehurst, always near water. The dates are April 15, April 20, July 29.

Cicindela punctulata *Fab.*

This species occurs sparingly in midsummer, in sandy roads and fields. It appears when the preceding species are not to be found or only sparingly found. The exact dates we have are Lakewood, June 22; Lakehurst, July 12, July 29, September 1; Brookville, July 28; Jamesburg, July 4, August 29, September 1.

Cicindela lepida *Dej.*

This species was found by Mr. William T. Davis in a sandy field near the cranberry bogs at Jamesburg on July 4 some years ago and he has since discovered other stations for it near Jamesburg, especially one on an island-like elevation of sand east of the South River and about midway between Jamesburg and Spotswood. It commences to appear in the latter part of June and is fairly abundant in colonies in July.

Cicindela rufiventris *Dej.*

This species is not named in Professor John B. Smith's "Insects of New Jersey" and its occurrence within the state was unknown until its discovery by Mr. Davis on the east plain near Brookville on July 27. The first specimens were taken on the top of a hillock, about 150 feet above sea level; others were found later on sandy roads through the plain and on the sandy margin of a creek. They occurred in colonies and there were long stretches of road without any. Two days later a diligent search at Lakehurst failed to reveal a single specimen and there is little doubt that it is confined to the East Plain, the most barren part of the pine barrens.

It is interesting to note that the nearest known stations for this species or its varieties are in the eastern part of Massachusetts and in Virginia.

Cicindela abdominalis *Fab.*

This also is a midsummer species. It has been found at Lakehurst, July 12, July 29 and September 1 and on the East Plain, at a comparatively low level, on July 27. At Lakehurst, it occurs on paths through the pine woods; it flies weakly and, when pursued, seeks safety by running under some convenient cover instead of by flight.

These notes seen to indicate that, while some species are confined to midsummer, most of the Pine Barren Cicindelæ appear late in the summer and continue until fall, when they hibernate in the sand and reappear early in spring; Mr. H. W. Wenzel informs me that many species recorded at Lakehurst on April 10 and April 15 have been found at Da Costa on March 16 when there was still snow on one side of the railroad cut in which they were found. The indications that some individuals hibernate are indeed very strong; but it may well be that others do not complete their transformation until spring and then join their more expeditious brethren to make up the greater spring abundance of specimens.

CLASSIFICATION OF THE POINTED-TAILED WASPS, OR THE SUPERFAMILY PROCTOTRYPIDÆ.—I.

BY WILLIAM H. ASHMEAD, A.M.,

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The writer, in his attempt towards a more natural classification of the Hymenoptera, in the Journal of the New York Entomological Society for March, 1899, separated these insects into *ten* superfamilies, namely: I, Apoidea; II, Sphecoidea; III, Vespoidea; IV, Formicoidea; V, Proctotrypoidea; VI, Cynipoidea; VII, Chalcidoidea; VIII, Ichneumonoidea; IX, Siricoidea, and X, Tenthredinoidea, which he considered were large natural groups, the sequence so arranged to show, as nearly as it were possible in a tabular arrangement, their affinities and relationship.

The new scheme of arrangement has been most favorably received notwithstanding its incompleteness, since only a few of these superfamilies have as yet been treated in toto and it is hardly possible yet, except in the vaguest way, for the student to appreciate the merits of the system in its entirety.

Of these ten superfamilies I have now classified down to genera, the Apoidea, the Sphecoidea, the Vespoidea, the Chalcidoidea,* the Ichneumonoidea, the Siricoidea and the Tenthredinoidea. The Formicoidea, the Proctotrypoidea and the Cynipoidea still remain to be treated.

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* To be published shortly by the Carnegie Museum, Pittsburgh, Pa.

In the present paper, or rather series of papers, I propose to give my ideas on the classification of one of these remaining superfamilies —the PROCTOTRYPOIDEA.

It has been just ten years since I wrote my monograph on the North American Proctotrypidæ. During these years I have made laborious studies into all the families of the Hymenoptera, and it is only natural, therefore, that my ideas and views should broaden and change with increased knowledge, that I should now see more clearly affinities and relationship in groups not before noticed, and that my conception of what constituted a family, still a vague term, should be modified.

In my opinion, the old conception of the family Proctotrypidæ was erroneous in some particulars; it was a complex group and represented more than a family; it really represented a superfamily, with many families. Some of the forms, too, classified as Proctotrypids, had no relation whatever with these insects, while others, placed elsewhere, the Pelecinidæ, *Monomachus*, etc., were in reality genuine Proctrypoids and should have been classified with them.

The subfamilies Bethylinæ, Embolemina and Dryininæ, too, as I have shown elsewhere, really represent a natural family of higher rank far removed from genuine Proctotrypoids, and belong among the Aculeata or Fossores.

These remarks will suffice to introduce and account for the changes made in the classification of this great complex.

CLASSIFICATION.

Superfamily V. PROCTOTRYPOIDEA.

Table of Families.

1. Trochanters distinctly *two*-jointed.. 2

Trochanters 1-jointed.

Antennæ 14-jointed, inserted on the middle of the face; front wings with a lanceolate stigma, the marginal cell long, open at apex; mandibles dentate; maxillary palpi 5-; labial palpi 3-jointed; ♀ abdomen greatly elongated, slender and cylindrical, about five times the length of the head and thorax united, composed of six segments; ♂ abdomen clavate.

Family L. PELECINIDÆ.

2. Antennæ inserted at the clypeus.. 6

Antennæ inserted on the middle of the face, often on a frontal prominence.

Wingless forms.. 5
Winged forms... 3
3. Front wings with the marginal vein linear, never stigmated......................... 4
Front wings with the marginal vein stigmated, or with a distinct stigma.
Mandibles dentate; antennæ 14- or 15-jointed; claws simple or pectinate; hind wings with a more or less distinct venation..............Family LI. HELORIDÆ.
Mandibles edentate; antennæ 13-jointed with one ring-joint (12-jointed without ring-jointed); claws simple; hind wings without a distinct venation.
Family LII. PROCTOTRYPIDÆ.
4. Front wings with a distinct basal cell and usually with a distinct marginal cell, the latter never wholly wanting although often incomplete; hind wings always with a basal cell; antennæ 14–15-jointed; labial palpi 3-jointed.
Family LIII. BELYTIDÆ.
Front wings rarely with a distinct basal cell, the median vein most frequently obsolete or subobsolete, the marginal cell never complete, usually wholly wanting; hind wings always without a basal cell; antennæ 11- to 14-jointed; labial palpi 2-jointed...Family LIV. DIAPRIIDÆ.
5. Mandibles edentate; tip of abdomen stylate..........Family LII. PROCTOTRYPIDÆ.
Mandibles dentate; tip of abdomen not stylate.
Labial palpi 3-jointed..Family LIII. BELYTIDÆ.
Labial palpi 2-jointed...Family LIV. DIOPRIIDÆ.
6. Wingless forms.. 8
Winged forms.
Abdomen acute or margined along the sides and sessile or subsessile............ 7
Abdomen rounded at sides, never acute or margined; front tibiæ with the apical spur, strongly forked; antennæ in ♀ 10- or 11-jointed, in ♂ 11-jointed; front wings always without a postmarginal vein, the stigmal vein long, the marginal vein either linear or stigmated..............Family LV. CERAPHRONIDÆ.
7. Front wings most frequently with marginal and stigmal veins; antennæ usually 12-jointed in both sexes, sometimes in ♀ 11-jointed, or 7-jointed when the club joints coalesce and form a single large joint............Family LVI. SCELIONIDÆ.
Front wings always without marginal and stigmal veins and most frequently entirely veinless, at most with only a submarginal or subcostal vein, which is sometimes clavate at apex; antennæ never more than 10-jointed, usually with the same number of joints in both sexes, rarely only 8- or 9-jointed.
Family LVII. PLATYGASTERIDÆ.
8. Abdomen along the sides rounded, not acute or margined; front tibiæ with the apical spur strongly forked..........................Family LV. CERAPHRONIDÆ.
Abdomen with the sides acute or margined; front tibiæ with one spur.
Antennæ 12-jointed, or if with a solid club 7-jointed; labial palpi two-jointed or more...Family LVI. SCELIONIDÆ.
Antennæ 10-jointed or less; labial palpi 1-jointed.
Family LVII. PLATYGASTERIDÆ.

Family L. PELECINIDÆ.

This family is represented by a single genus, with several species, confined to the New World, *i. e.*, North and South America.

Our common species, *Pelecinus polyturator* Drury, is not rare in some of the Northern States, in August and September, and the female forms a conspicuous object when flying, since its flight is slow and difficult on account of its abnormally lengthened abdomen. The male, on the contrary, is extremely rare and exceeding rapid in flight. It is sharp-eyed, takes flight rapidly and is rarely captured.

According to Prof. S. A. Forbes, *P. polyturator* Drury, lives parasitically upon the larvæ of our May beetles (Lachnosternæ).

Antennæ 14-jointed, inserted on the middle of the face.

Abdomen in ♀ very long, cylindrical, several times longer than the thorax, in ♂ clavate............**Pelecinus** *Latreille* (type *Ichneumon polyturator* DRURY).

Family LI. HELORIDÆ.

This family is readily distinguished by the characters made use of in my table of families. It forms a connecting link between the family Pelecinidæ, probably the oldest type of a Proctotrypoid, and the Proctotrypidæ and the Belytidæ.

The Helorinæ attack the golden-eyed flies, Chrysopidæ, while the Monomachinæ, I suspect, are parasitic upon ant-lions, Myrmeleonidæ.

TABLE OF SUBFAMILIES.

Claws simple; basal nervure normal, not broken; abdomen longly petiolated; antennæ 14-jointed..Subfamily I. MONOMACHINÆ.

Claws pectinate; basal nervure abruptly broken and bent downwards forming a triangular discoidal cell; antennæ 15-jointed............Subfamily II. HELORINÆ.

Subfamily I. MONOMACHINÆ.

Table of Genera.

Front wings with only one discoidal cell, the first absent; apex of metathorax strongly produced beyond the insertion of the hind coxæ; body of abdomen in the female strongly compressed, long, narrow, lanceolate, in male fusiform, head with temples and cheeks strongly buccate; scape of antennæ rather long.

Monomachus *Westwood* (type *M. gladiator* (KLUG) WESTWOOD).

Front wings with two discoidal cells, the first present; apex of metathorax truncate; body of abdomen in ♂ compressed, as seen from the side triangular or pyriform in outline; head not buccate; scape of antennæ short.......**Roptronia** *Provancher* (type *R. pediculata* PROV.).

Subfamily II. HELORINÆ.

Only a single genus is known in this subfamily which may be recognized by the following characters:

Antennæ 15-jointed, the scape short; abdomen ovate or oblong-oval, the second very large; claws pectinate..**Helorus** *Latreille* (type *Sphex anomalipes* PANZER).

Family LII. PROCTOTRYPIDÆ.

This family is parasitic upon the larvæ of beetles and is easily separated from all the other families by the edentate mandibles and by abdominal peculiarities; the abdomen in the females terminates in a stylus or cauda, in the males in two spines or prongs. The antennæ are 13-jointed, with *one* ring joint, in both sexes, the scape very short, oval, the pedicel very minute and often more or less hidden within the apex of the scape.

Table of Genera.

1. Males; abdomen ending in two prongs or spines.. 3
   Females; abdomen ending in a stylus or cauda.
      Wingless forms.. 2
      Winged; maxillary palpi 4-jointed, the last joint linear.
         Mesonotum with distinct parapsidal furrows ....**Disogmus** *Förster*
         (type *Proctotrypes areolatus* HAL.).
         Mesonotum without parapsidal furrows..............**Proctotrypes** *Latreille.*
         (type *Ichneumon gravidator* LINNÉ).
2. Metathorax smooth; maxillary palpi short, 3-jointed, the last joint subclavate.
   Codrus *Jurine* (type *Proctotrypes apterogynus* HAL.).
3. Metathorax rugose or areolated; maxillary palpi 4-jointed.
      Mesonotum with parapsidal furrows................................**Disogmus** *Förster.*
      Mesonotum without parapsidal furrows......................**Proctotrypes** *Latreille.*
   Metathorax smooth, exareolate; maxillary palpi 3-jointed..........**Codrus** *Jurine.*

Family LII. BELYTIDÆ.

The venation, which is quite distinct from the other families, distinguishes the family. The antennæ are porrect, inserted on a frontal prominence, filiform, setaceous or subclavate, and 14- or 15-jointed, with a long scape; mandibles usually short, with a tooth within, rarely falcate and decussate; maxillary palpi 4 or 5-jointed; labial palpi 3-jointed; legs rather long and slender, the tibial spurs 1, 2, 2, the tarsi long and slender, 5-jointed, the claws always simple; while the abdomen is variable in shape but always distinctly petiolate.

The family comes quite close to the Diapriidæ but is easily separated by having 3-jointed labial palpi and by the venation of the hind wings, which have a basal cell.

The group is supposed to be parasitic upon Dipterous larvæ inhabiting fungi. *Betyla fulva* Cameron is recorded from *Bolitophila luminosa.*

Table of Genera.

1. Females.. 2
   Males..18
2. Antennæ 13-jointed...17
   Antennæ 14- or 15-jointed.
      Antennæ 15-jointed... 3
      Antennæ 14-jointed...16
3. Abdomen with more than 4 dorsal segments................................... 6
   Abdomen with 3 or 4 dorsal segments.
      Marginal vein not or scarcely longer than the marginal cell.................. 4
      Marginal vein more than twice the length of the marginal cell.
      Macrohynnis *Förster* (type unknown).
4. First funicle joint not unusually long....................................... 5
   First funicle joint unusually long, nearly as long as all the rest of the joints united, the intermediate joints transverse-moniliform.
   Diphora *Förster* (type *D. westwoodi* FÖRST.).

5. Abdomen with three, rarely with 4 dorsal segments, the second not greatly lengthened, the third long and strongly compressed at sides; marginal vein not shorter than the marginal cell; antennæ filiform, pubescent, the funicular joints all long. **Leptorhaptus** *Förster* (type *L. abbreviatus* FÖRSTER).

Abdomen with 3 dorsal segments, the second very much lengthened, nearly extending to the tip of the abdomen, the third issuing from it as a short stylus; marginal vein usually distinctly shorter than the marginal cell, antennæ filiform, pubescent, the 5 or 6 terminal joints oval, the others long.......... **Miota** *Förster* (type unknown).

6. Abdomen with 7 or 8 dorsal segments.. 7

Abdomen with 5 or 6 dorsal segments, long and slender.

Abdomen with 5 segments, the last three long and slender, together as long as the second and resembling the terminal segments of a scorpion; antennæ long, filiform......... **Scorpioteleia** *Ashmead.* (Type *S. mirabilis* ASHM.).

Abdomen with 6 segments, the tip curving upwards, the second segment hardly longer than the long petiole, dorsally triangularly excised at apex, the third a little longer than 4 and 5 united, the last conical; antennæ filiform, the last joint ovate, stouter and about as long as the two preceding joints united. **Stylidodon** *Ashmead* (type *S. politum* ASHM.).

7. Winged forms; thorax normal; ocelli present..7½

Wingless; thorax narrow, attenuated; head oblong oval; ocelli wanting. **Betula** *Cameron* (type *B. fulva* CAM.).

7½. Abdomen with 8 dorsal segments.................. 9

Abdomen with 7 dorsal segments.

Antennæ clavate-moniliform, the first funicle joint slightly longer than the pedicel, all the others to the last, moniliform, the last enlarged, oval; first abscissa of the radius usually straight, rarely very oblique. **Acroplesta** *Förster* (type *A. collaris* FÖRST.).

9. Eyes bare.................................. 15

Eyes hairy.

Middle carina of metanotum not divided.. 10

Middle carina of metanotum divided, or wanting.............. **Belyta** *Jurine* (type *B. bicolor* JURINE).

10. Postscutellum normal, unarmed......................... 11

Postscutellum armed with a strong thorn or spine................ **Oxylabis** *Förster* (type *Belyta bisulca* NEES.).

11. Third dorsal segment of abdomen not, or very little, longer than the fourth.. 12

Third dorsal segment of abdomen much longer than the fourth.

Mandibles short, small; marginal vein as long as the marginal cell; antennæ filiform, pubescent, the last flagellar joint more than twice as long as thick. **Cinetus** *Jurine* (type unknown.)

Mandibles long, falcate, decussate; marginal vein shorter than the marginal cell; last funicular joint not more than twice as long as thick. **Xenotoma** *Förster* (type *Belyta bicolor* NEES.).

12. Marginal cell open at apex.. 13

Marginal cell closed.

First abscissa of the radius straight from the margin, shorter than the marginal vein; funicular joints only slightly shortening..........**Zelotypa** *Förster* (type unknown).

First abscissa of the radius oblique, usually longer than the marginal vein; funicular joints strongly shortening, the apical joints wider than long. **Pantoclis** *Förster* (type *Belyta brevis* NEES).

13. Stigmal vein very short, with an uncus, marginal vein as long as the basal nervure 14

Stigmal and postmarginal veins much shortened but distinct.

Stigmal vein originating at almost a right angle; antennæ filiform, funicle joints 2–12 transverse moniliform, the pedicel obconical. **Zygota** *Förster* (type *Belyta abdominalis* NEES).

Stigmal vein originating at a very oblique angle; antennæ clavate, moniliform, the first funicle joint only a little longer than thick and smaller than the pedicel .... **Aclista** *Förster* (type unknown).

14. Mandibles conical, not rostriform; palpi 4-jointed; scape at tip produced into a little spine .... **Synacra** *Förster* (type *Diapria brachialis* NEES).

15. Mesonotum with distinct parapsidal furrows; marginal cell long, open; antennæ clavate, moniliform, the first funicle joint slightly longer than the pedicel. **Psilomma** *Förster* (type unknown).

Mesonotum without parapsidal furrows; marginal cell not long and closed; antennæ subfiliform .... **Ismarus** *Haliday* (type *I. dorsiger* CURTIS).

16. Wingless; ocelli wanting ....**Anommatium** *Förster* (type unknown).

Winged; ocelli present.

Marginal cell distinct, closed; antennæ filiform or subclavate. **Anectata** *Förster* (type unknown).

Marginal cell wanting or only slightly developed; antennæ subclavate, moniliform, pubescent, the first joint of funicle smaller than the pedicel...................... **Pantolyta** *Förster* (type *Belyta heterocera* HAL).

17. Parapsidal furrows obsolete; angles of metathorax spined. **Malvina** *Cameron* (type *M. punctata* CAM).

18. Petiole of abdomen nearly twice as long as the metathorax........................ 19

Petiole of abdomen not, or scarcely, longer than the metathorax.................. 21

19 Marginal vein not twice as long as the marginal cell................................ 20

Marginal vein twice as long as the marginal cell..........**Macrohynnis** *Förster*.

20. Second abdominal segment compressed laterally; petiole above smooth.

Antennæ filiform, the scape as long as the first funicular joint, the latter strongly emarginate at base ....**Leptorhaptus** *Förster*.

Antennæ filiform, pubescent, the scape shorter than the first funicular joint, the latter not so strongly emarginate at base..................**Miota** *Förster*.

Second abdominal segment not compressed laterally, the abdomen becoming more flattened behind this segment, the petiole above more or less furrowed; scape longer than the first funicle joint.............................**Cinetus** *Jurine*.

21. Middle carina of metathorax not divided 22

Middle carina of metathorax divided or absent.

Marginal vein scarcely longer than the stigmal, the marginal cell long; antennæ filiform, all the joints long, cylindrical, the first funicular joint emarginate at base...**Belyta** *Jurine*.

22. Postscutellum without a spine...23

Postscutellum with a spine or thorn...**Oxylabis** *Förster*.

23. Eyes hairy...24

Eyes bare...29

24. Scape normal, not produced on one side into a tooth at apex...25

Scape abnormal, the apical margin on one side produced into a tooth; marginal cell closed...**Acropiesta** *Förster*.

25. Marginal cell completely closed...26

Marginal cell open or wanting...28

26. Marginal vein at least twice as long as the first abscissa of the radius (stigmal vein)...27

Marginal vein not or only a little longer than the first abscissa of the radius, the latter usually oblique.

Marginal cell abnormally large, lanceolate, extending nearly to the tip of the wing.

Marginal cell normal...**Betyla** *Cameron*.

Last ventral segment straight and punctate.

Front tibiæ normal...**Anectata** *Förster*.

Front tibiæ bent with a spined process near the middle.

Zygota *Förster*.

Last ventral segment somewhat bent, impunctate....**Pantoclis** *Förster*.

27. First abscissa of the radius (the stigmal vein) straight or perpendicular, forming a right angle with the margin, rarely slightly oblique.........**Zelotypa** *Förster*.

28. Marginal cell more or less present.

Marginal cell much lengthened; front tibiæ bent and outwardly on side near the middle, produced into a tooth or spine...........**Zygota** *Förster*.

Marginal cell not much lengthened; front tibiæ normal.....**Aclista** *Förster*.

Marginal cell wanting.

Basal nervure distinct; antennæ filiform, pubescent, the joints lengthened, the first flagellar joint twice as long as the pedicel and slightly emarginate at base...**Pantolyta** *Förster*.

29. Mesonotum with parapsidal furrows; marginal cell long, open; antennæ stout, filiform, the first flagellar joint longer than the second, slightly emarginate at base, the joints after the second hardly twice as long as thick.

Psilomma *Förster*.

Mesonotum without parapsidal furrows; marginal cell closed; antennæ filiform, not stout, the first flagellar joint shorter than the second...**Ismarus** *Haliday*.

PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING OF MAY 6, 1902.

A regular meeting of the New York Entomological Society was held at the American Museum of Natural History. President Groth in the chair with thirteen members present.

Messrs. Graef, Roberts, Sherman and Southwick were elected active members of the society.

Some discussion was held in reference to an amendment to provide for the office of librarian, and upon motion of Mr. Love, the secretary, and Mr. Joutel were appointed to draft such an amendment to propose at the next regular meeting.

After some discussion the society decided to take some action concerning the loss of Mr. Schaeffer's services to the museum. Mr. Southwick moved that a committee of three be appointed to draft a resolution expressing the regret of the society. The president appointed to serve on that committee Messrs. Love, Barber and Zabriskie. After a few moments' intermission the committee presented the following resolution :

The New York Entomological Society having learned that Mr. Charles Schaeffer is to sever his connection with the American Museum of Natural History, wishes to express its high appreciation of his ability and worth and its regrets that the museum is to lose his services.

Mr. Southwick moved the adoption of the resolution, which was carried and the secretary was instructed to forward a copy to the director of the museum, Mr. H. C. Bumpus.

Mr. Joutel exhibited some colored drawings of an undescribed Limacodid larva and also illustrations of *Adoneta spinuloides* for purposes of comparison. He called attention to the entirely different dorsal pattern of the two which also differ in color. The new Limacodid larva also had enlarged and extremely elongated horns on the last segment. The horns in the second segment were also much thicker and longer than those on *A. spinuloides*. The larva may prove to be *Monoleuca semifacia* of which the larva is unknown at present. As Dr. Dyar, to whom he had given the cocoons, had been unsuccessful in rearing them the larva was still in doubt.

Mr. Beyer made some remarks in his experience in breeding Coleoptera in Lower California. He obtained the best results by placing the infested wood in a box with no additional moisture. He stated that many species which were at present rare in collections, were in reality found to be common when properly bred.

Society adjourned.

MEETING OF MAY 20, 1902.

A regular meeting of the society was held at the American Museum of Natural History, with President Groth in the chair and eleven members present.

The secretary read a communication received from Dr. Bumpus acknowledging the receipt of the society's resolution in reference to Mr. Schaeffer.

The committee appointed to draft an amendment clause to the by-laws to provide for the office of librarian proposed the following amendment :

Article IV shall be amended to include the office of librarian.

Article IX.—It shall be the duty of the librarian to receive and take charge of all books, pamphlets and other publications acquired by the society and to keep a complete record and catalogue of all acquisitions. He shall publish in each journal a list of additions obtained during the previous quarter. He shall keep a record of the copies of the journal used in exchange and held in reserve, and also see that exchanges are regularly received. He shall make an annual report to the society. He shall also attend to such other duties as may be determined by the society.

By motion of Mr. O'Connor the society accepted the report.

There was considerable discussion in reference to the present state of the library and it seemed to be the consensus of opinion that the number of our journals now published could well be reduced.

Mr. Leng exhibited a very fine collection of Cicindelidæ which represents nearly all of the species and varieties to be obtained in the United States and made some remarks on the geographical range of a number of the species. Mr. Leng pointed out that certain species were rare in collections because they occurred only in a limited area. For example, *C. hyperborea* has been found only at Methy Portage, 500 miles north of the Canadian boundary, *C. perviridis* only in the Sierra Nevada, California, and *C. striga* only in Florida. He stated that the Rocky Mountains limited the westward range of many of our species, *scutellaris* for example or *sex-guttata*. Many species are confined to the Atlantic sea-board or the Southern States and comparatively few to California. Many extend over a wide area and if their range crosses the Rocky Mountains it seems usually to cross the Sierra Nevada also. He alluded to the distribution of *C. longilabris* inhabiting all of Canada apparently, Maine, White Mountains, Rocky Mountains and Sierra Nevada; also *C. lepida* and *C. limbata* occurring in widely separated regions.

He mentioned the occurrence of *C. rufiventris* in New Jersey in the East Plains, near Brookville, in July. He also spoke of the scarcity of records from West Virginia, Tennessee and Kentucky which seems to indicate that there is an extensive territory thereabout which has been insufficiently worked.

In discussing the paper Mr. Schaeffer mentioned having taken a single specimen of *Cicindela unipunctata* at Bronx Park several years ago.

Mr. Joutel stated that he had taken *C. scutellaris* near Aqueduct, Long Island, in a very restricted locality.

Mr. Barber then spoke on "The Families of the Aquatic Hemiptera." He showed a few typical specimens to represent the aquatic and subaquatic families of hemiptera that occur in the United States. He briefly stated the family characteristics and mentioned the occurrence of the various representatives of the families in the eastern United States.

Society adjourned.

Meeting of June 3, 1902.

A regular meeting of the New York Entomological Society was held at the American Museum. President Groth presided with the following members present: Messrs. Barber, Joutel, Love, O'Connor, Schaeffer, Sherman, Torre-Bueno, and Watson.

A communication from Dr. Britton in reference to a grant of $50.00 for research was read. After some discussion Dr. Love moved that the communication be tabled. Carried.

Mr. Joutel, of the Field Committee, reported that the Jamesburg field meeting in which the society expected to participate, along with other societies, had been abandoned. He also reported on the satisfactory results of the Ramapo meeting and announced the next field trip would be to Little Falls, N. J., on Sunday, June 15.

The amendment to the by laws to provide for the office of librarian, proposed at the last regular meeting of the society, was on motion of Mr. Joutel accepted.

Dr. Love moved that this ammendment be numbered IX, and the succeeding numbers be changed to conform. Carried.

On motion of Dr. Love, Mr. Schaeffer was nominated as librarian. Dr. Love moved that the secretary be impowered to cast the unanimous vote of the society for Mr. Schaeffer as librarian. Carried. As instructed the secretary cast a unanimous vote for Mr. Schaeffer.

A communication from Mr. Beutenmüller was read in which he advised the society to present to the Congressional Library at Washington a complete set of the JOURNAL. He also announced that the Hubbard and Schwartz collection of Coleoptera was now the property of the U. S. National Museum.

On motion of Dr. Love the society voted to present a set of our JOURNAL to the Congressional Library.

Mr. Torre Bueno then read a paper entitled "Some Preliminary Notes on the Early Stages of *Notonecta.*" Mr. Bueno stated that in one case the female in his aquarium deposited eggs the latter part of March and in another case on the 11th of May. The average period of incubation was thirteen days. He pointed out that the manner in which the eggs were deposited was quite different from the usual account, as he found that the female did not make a slit in the epidermis of the leaf or stem, but merely glued the eggs along the sides in a rather irregular fashion on the surface. One female on May 11th deposited a batch of thirty eggs. He gave a full detailed description of the egg and the young larva up to the second moult. About fifteen days elapsed between emergence of larvæ and first moult, and eleven days between the first and second moult. He stated that he had considerable difficulty in securing the right kind of food for the developing young, and because of their cannibalistic habits he had experienced some trouble in rearing them to the second stage. The eggs and larvæ are *Notonecta undulata.* Mr. Bueno exhibited some microscopic slides showing the various conditions of eggs and larvæ.

Mr. Schaeffer presented some Coleoptera notes with specimens and made some remarks on the range and habits of a few forms.

MEETING OF JUNE 17, 1902.

A regular meeting of the society was held at the residence of Mr. Louis H. Joutel, 164 East 117th St. Mr. Groth in the chair with the members present: Messrs. Barber, Beyer, Comstock, Davis, Green, Holmes, Joutel, Leng, Love, Münch, Schaeffer and Watson.

On motion of Mr. Barber the society directed the field committee to arrange for an excursion to Jamesburg, N. J., for July 4 to 6.

Moved by Mr. Leng and seconded that the society pay the expenses of one member of the field committee in order that he might visit Jamesburg previous to the meeting and report to the members the sort of accommodations to be obtained. Carried

The field committee reported that only three members attended the field meeting at Singac, N. J., on June 15.

The first paper of the evening was by Mr. Schaeffer "On Some New Myrmecophilons Collected in Texas by Mr. Brues." Mr. Schaeffer explained the novel way in which Mr. Brues had taken the beetles in ant hills and gave the following list of captures: One new species of silphid, *Ptomophagus texanus* (n. sp.), *Eatonidia wheeleri* Was , and *Ecitoxemia brevipes* Brues.

Mr. Joutel showed some of the larvæ and cocoons of the Japanese *Caligula japonica.*

Society adjourned.

MEETING OF OCTOBER 7, 1902.

A regular meeting of the New York Entomological Society was held at the American Museum of Natural History. President C. F. Groth presided with eleven members and two visitors present.

Mr. Barber, of the Auditing Committee, reported that the committee had examined the accounts of the treasurer and found them correct.

A communication from Mr. Beutenmüller was read, in which he stated that he took pleasure in turning over to the society all of the books and pamphlets received by him in exchange for the JOURNAL.

Mr. Kearfott introduced and moved the adoption of the following resolution; Resolved that the thanks of the society be extended to Mr. Wm. Beutenmüller for his care and safe keeping of the society's library; and that a copy of these resolutions be transmitted by the secretary to Mr. Beutenmüller. Resolution adopted.

Moved by Dr. Love and seconded, that the librarian prepare a list of all papers and books in the possession of the society, together with a list of missing numbers, in order that the publication committee might revise the exchanges, and report the same to the society as early as possible. Carried.

Mr. Davis spoke about "Some Beetle Remains from a Staten Island Peat Bog." He stated that during the summer of 1899 a small pond in the Moravian Cemetery on Staten Island was drained and the mud and vegetable remains removed and piled along the margin of the pond. This material could be separated into thin sheets, and the vegetable growth of centuries, that had been deposited layer upon layer, could be turned over and examined just as could the leaves of a book. On examining these layers with a lens the elytra of a species *Donacia* were found and also a number of the pupa cases which *Donacia* attach to various water plants. The remains were not sufficiently well preserved to enable him to determine the species. Mr. Davis exhibited a number of these beetle remains just as they were found imbedded in the peat.

Mr Schaeffer said that he wished to put on record the capture of the true queen of the white ant (*Termes flavipes*) at Mosholu this summer. He explained the manner in which he had obtained the queen by chopping into pieces a piece of infested wood. Mr. Schaeffer remarked that Professor L. O. Howard in his "Insect Book" states that the true queen of the white ant has never been found in the United States

He also exhibited both sexes of *Tetranodes nivicollis* of which Mr. Linell, when describing it, had only the male, remarking under the description tha would be interesting to know if the greatly inflated antennal joints are only peculiar to the male or common to both sexes. Mr. Schaeffer said that possessing both sexes he can add to the description that the female has the same joints simple, like our species of *Euderces* to which *Tetranodes* is closely allied.

He also exhibited a few specimens of the hithertofore unique *Lachnosterna æqualis* Lec. and also one specimen of *L. exorata* Horn., both from Brownsville, Texas. Of the former only females are known and of the latter only males and he said that there is hardly any doubt that *exorata* is the male of *æqualis*. Dr. Horn's description of *exorata* fits equally well *æqualis* except in some sexual differences.

In the discussion which followed Mr. Joutel stated that he had recorded in this JOURNAL the capture of the true queen of the white ant several years ago.

Mr. Hugo Pfordte made some interesting remarks on collecting butterflies in Peru, S. Am. He exhibited a number of colored reproductions made by his father, Mr. Otto Pfordte, from the material obtained in South America.

Mr. Joutel exhibited a live nymph of the preying mantis (*Tenodero sinensis*) which he had reared in his yard from eggs sent to him from Philadelphia by Mr. P. Laurent. Mr. Joutel stated that he had placed a number of the egg masses of this species in the Fort Lee district with the hope that they would survive as they have at Phiadelphia.

MEETING OF OCTOBER 21, 1902.

A regular meeting of the society was held at the residence of Mr. L. H. Joutel, No. 164 East 117th Street. President C. F. Groth in the chair with sixteen members and two visitors present.

Mr. Watson proposed as an active member Mr. Chas. Meyers, 993 Boston Road, City.

In a communication read by the Secretary Mr. Beutenmüller presented a number of his entomological writings to the Society.

Moved by Dr. Love and duly seconded that the thanks of the society be extended to Mr. Beutenmüller for the papers and books received. Carried.

Dr. A. S. Packard made a few remarks concerning the progress that was being made by him in the revision of certain groups of the Bombycine moths. He stated some interesting facts about the distribution of certain genera which occurred in South America and also in Africa. The evidence seemed to show that there might have existed some sort of a land communication between the two countries at one time.

Mr. Leng spoke of the "Local Races of *Cicindela*" and exhibited specimens of *C. rugifrons* from Massachusetts, from Long Island and from the Pine Barrens of New Jersey; each form presented recognizable characteristics resulting from the isolation of its abode and consequent inbreeding over a large period. While the localities represented are not widely separated in respect of miles, and the distance would not preclude communication among insects which fly or are carried by wind storms or floods, the separation is complete for insects like the Cicindelidæ, which are restricted to a limited suitable area and whose larvæ burrow in the sand while the imagines seek shelter as soon as the weather becomes even cloudy. Specimens of *C. unicolor*, also exhibited, from North Carolina and from Louisiana showed even more marked differences, as might be expected from the greater distance involved. In the case of *C.*

6-guttata specimens were shown from Louisiana and New York and the differences were evident. In this species the local races have already received names as exemplified in *harrisii* and *violacea*.

Specimens of *C. lecontei* were shown from Iowa and from Canada and served to enforce the argument, viz: that in *Cicindela* each described species having any extended range consists of a group of closely related races recognizable even when only moderately removed geographically and remarkably different when the geographical separation is considerable.

Mr. Davis stated that while in the pine barrens at Lakehurst, N. J., Mr. Leng and himself saw many specimens of *Hemileuca maia* flying over the scrub-oak, etc., on the mornings of October 18 and 19. None was noticed in the afternoon. As the moths flew rapidly they were exceedingly difficult to capture.

Mr. Davis also exhibited two mature specimens of the Japanese mantis (*Tenodero sinensis*) which were raised in his garden at New Brighton, Staten Island, from eggs presented to him by Mr. P. Laurent, of Philadelphia. He stated that the insects had lately been fed on raw meat.

Mr. Doll recorded the fact that while in the Adirondack Mountains the past summer he had collected and since reared to the pupa stage what is undoubtedly a new variety and possibly a new species of moth, judging from the peculiarities of the caterpillar. The larva is quite similar to *C. imperialis*.

Mr. Joutel exhibited a *Hydrœcia* moth which he had reared from the caterpillar. Mr. Bird pronounced it to be *H. appassionata*, a very rare moth, of which the type is in the British Museum.

On the invitation of Mr. Leng, Dr. Love moved that the next meeting of the society be held at the residence of Mr. Chas. W. Leng, 119 Columbia street, West New Brighton, S. I., on the afternoon of November 4.

Society adjourned.

MEETING OF NOVEMBER 4, 1902.

An informal meeting of the society was held at the residence of Mr. Chas. Leng, 119 Columbia street, West New Brighton, Staten Island, at 2.30 P. M.

A short business session was held with President C. F. Groth in the chair. Ten members and three visitors present.

Chas. Meyers, 993 Boston Road, was elected an active member of the society.

A communication from Prof. J. B. Smith was read in reference to giving us a lecture on "Mosquitoes, Their Life-History and Habits."

Dr. Love moved that the thanks of the society be extended to Professor Smith and that the secretary and president arrange for the museum hall, dates, etc., with the museum authorities.

Mr. Leng exhibited under the microscope a specimen of *Stenus* sp. received by Mr. Luetkins from Texas that showed the ligula much extended after death. The reason for this protrusion of the ligula is not known and it seems to have been rarely noticed. Mr. Casey remarks in one of his papers that it occurred in only three specimens out of 3,000 that had come under his observation. This peculiarity has not been recorded as occurring in any other Coleoptera so far as known.

Mr. Davis exhibited a live specimen of *Hydrophilus ovatus*, which is quite rare in this locality, collected at Mariner's Harbor, Staten Island.

Society adjourned to partake of an excellent luncheon and inspect Mr. Leng's collection of Coleoptera, which is particularly rich in Cicindelidæ and Coccinellidæ.

MEETING OF NOVEMBER 18, 1902.

A regular meeting of the New York Entomological Society was held at the American Museum of Natural History. President C. F. Groth presided, with thirteen members present.

Mr. Charles Meyers proposed as active members: Mr. C. P. Benedict, Manor Road, West New Brighton, and Mr. Charles E. Snyder, 2140 Prospect Avenue, Bronx Park, City.

Mr. Leng moved that a committee of five be appointed by the president to solicit contributions of money and manuscript for the purpose of publishing a Handbook of Coleoptera of Northeast America. Carried.

Mr. Watson recorded the capture of four specimens of *Monoleuca semifascia* at South Lakewood, N. J., on July 11, 1902. Being attracted by the lights they were captured on the screen door. This species is extremely rare in this locality as only one previous record of its capture has been found and that at Morris Plains, N. J.

Mr. Watson also made some remarks "On the Larvæ of *Thecla titus* Fabr." He stated that the butterfly is single-brooded, quite generally distributed, and locally common about New York city. It is found on the wing from the middle of June to the middle of July. The larvæ are slug-shaped and of a general green color, pinkish at either extremity. They are about ¾ of an inch long when full grown. He found the larvæ full grown on May 24, 1902, at Van Cortlandt Park feeding on wild cherry. The larvæ are night feeders, and he found them during the day hiding on the stems of small plants, or in most cases, buried an inch or two beneath the surface of the ground. They were sometimes found just above the surface but covered with dirt, etc., which had been piled up by ants. The larvæ always had a few ants crawling about them, which feed on the juices which exude from the caterpillars. Sometimes the ants were so numerous as to completely cover the caterpillars. It was a very easy matter to locate the caterpillars by looking around the base of the wild cherry for the ant workings. When ant workings were missing no larvæ were found.

Mr. Joutel stated that he had found the larvæ of *Thecla acadica* at Greenwood Lake, and that while some of the larvæ were in hiding at the base of the stems during the day, there were some of all ages feeding on the leaves, so that it cannot be called a nocturnal feeder. The ants take great care of the larvæ, and as Mr. Watson remarked of the larvæ of *Thecla titus*, feed on the exudations of the caterpillar. It is still a question in what stage the insect winters, as what were undoubtedly eggs of this species were found on the leaves by Mr. Watson and himself. All of the larvæ pupated and emerged at the same season, but he had no opportunity to visit the locality later to look for a second brood.

Mr. Barber exhibited a collection of Coleoptera made at Cold Spring Harbor, Long Island, during the past summer, and made some remarks about the excellency of the locality as a collecting ground.

The president appointed the following committee of five to secure contributions for the Handbook of Coleoptera: Messrs. Leng, Davis, Joutel, Love and Schaeffer.

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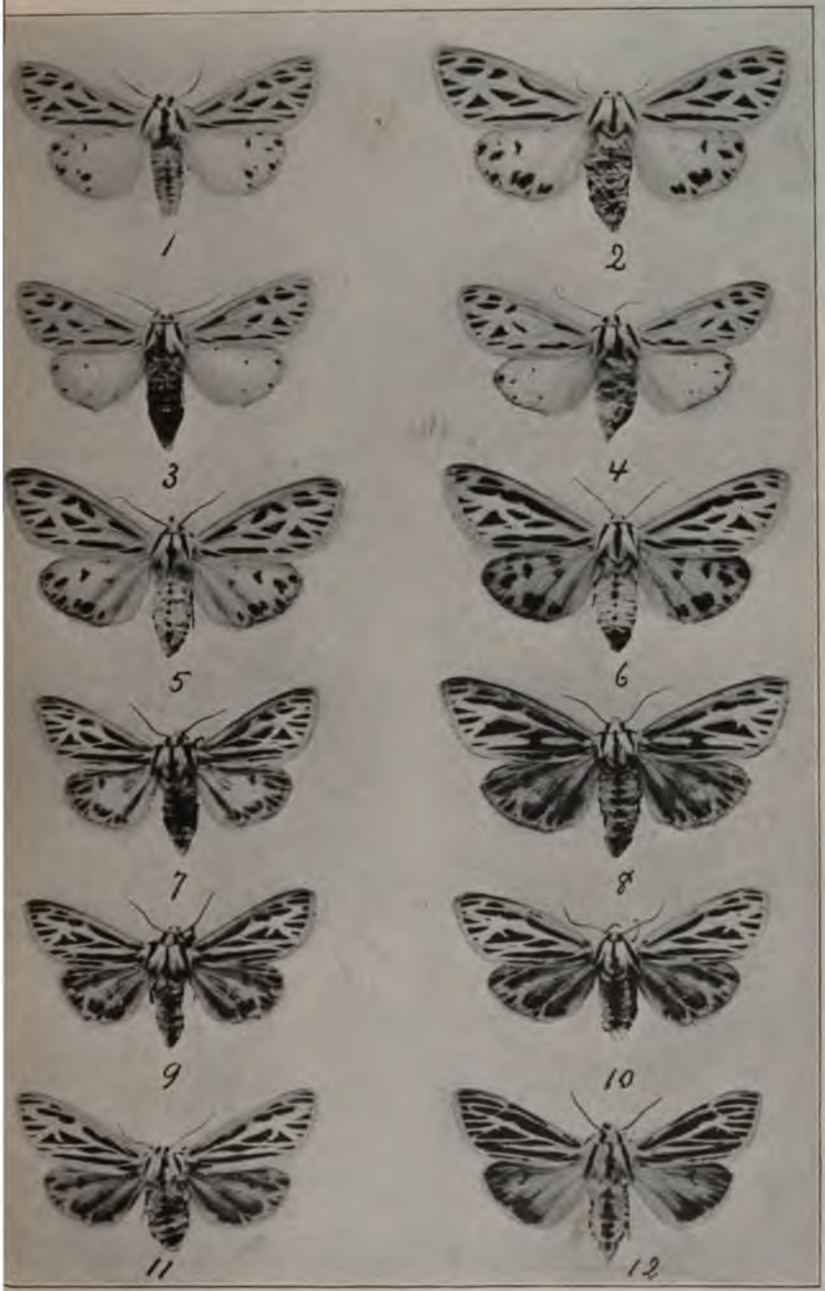
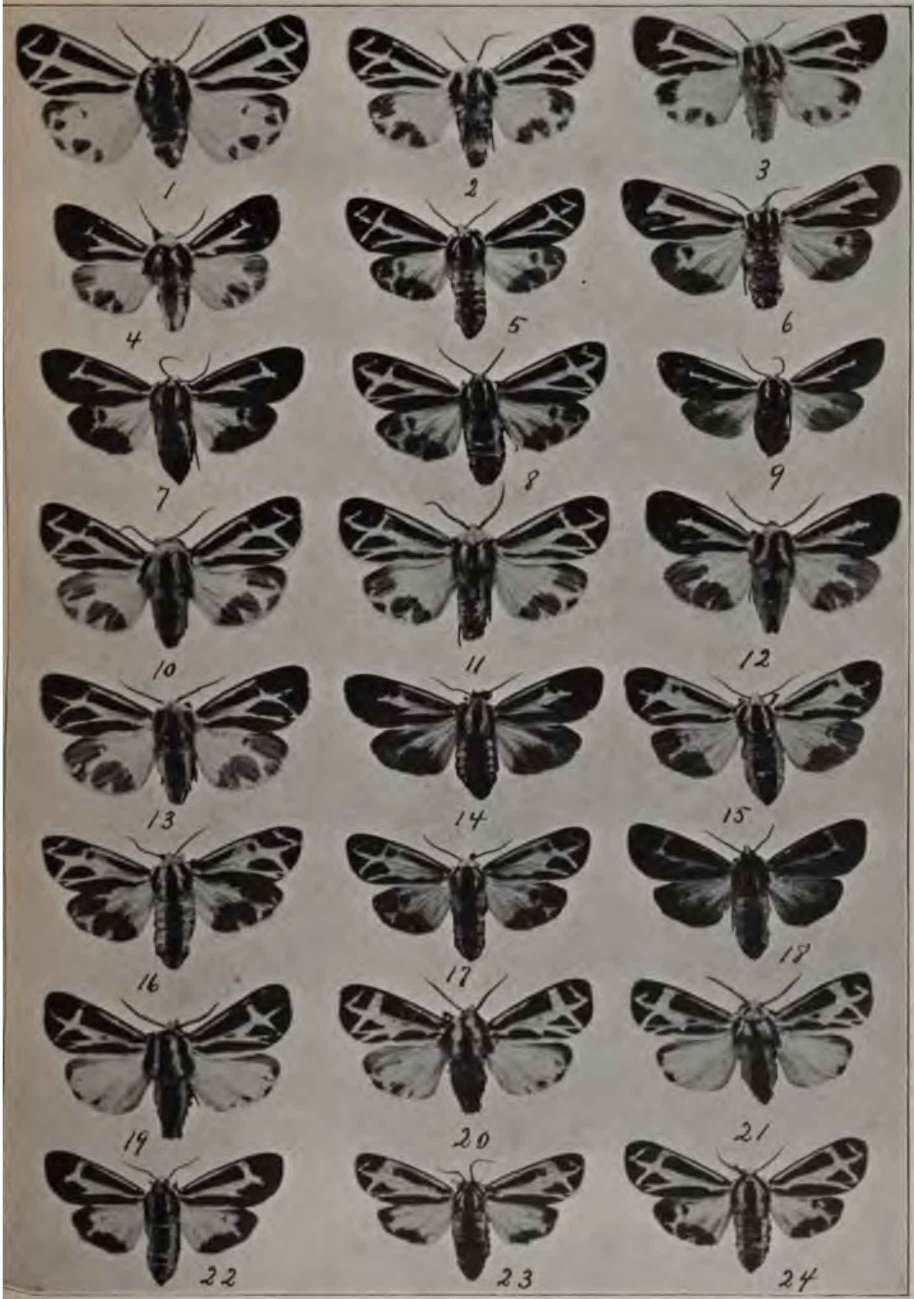
ERRATA.

Page 4, line 12 from bottom : for July 30 read July 3.
" 6, line 16, 3d column from top : for July 2 read August 21.
" 10, lines 16, 18, 20 from top : for male read female.
" 142, for van-orbicularis read vau-orbicularis.
" 20, line 4 from bottom : for *coues* read *couesi*.
" 21, line 12 from top : for *hymenalis* read *hyemalis*, and for *Lannis* read *Lanius*.
" 21, line 13 from bottom : for *Aegialites* read *Agialitis*.
" 22, line 3 from bottom : for *pencillatus* read *penicillatus*.
" 25, line 6 from bottom : for *Polyphorus* read *Polyborus*.
" 26, line 1 from top : for *Haliætus* read *Haliaætus*.
" 163, line 16 from top : for *accipitrinus* read *Accipitrinus*.
" 166, line 17 from bottom : for *Vestiarea* read *Vestiaria*.



Arctia arge and varieties.



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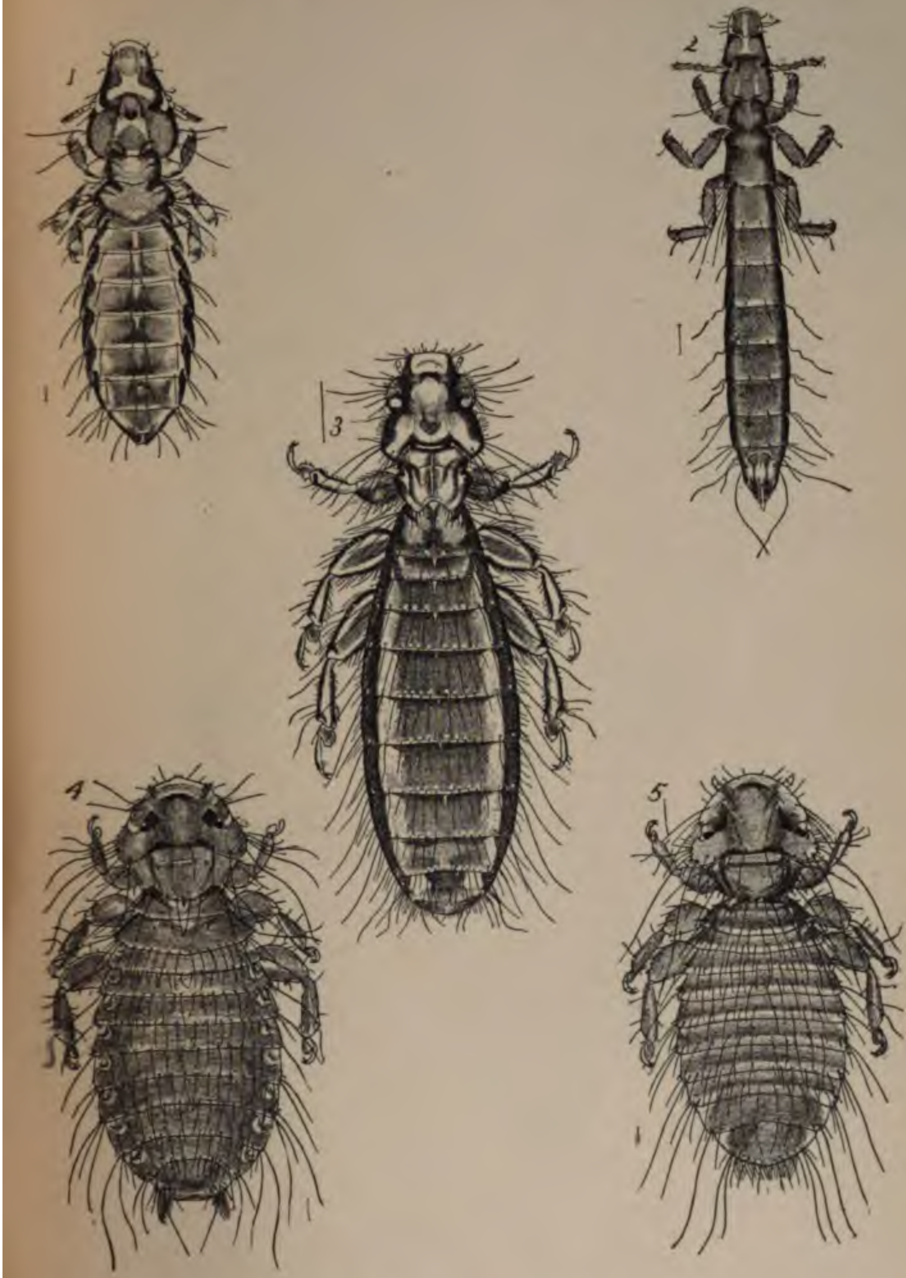
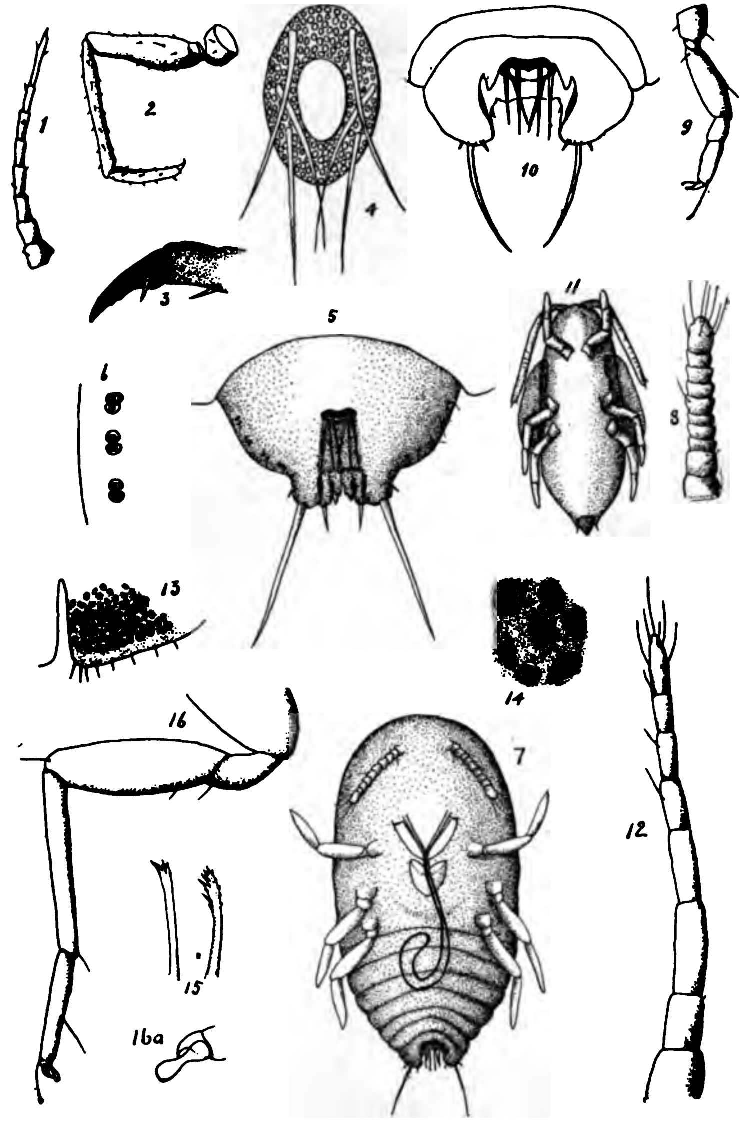
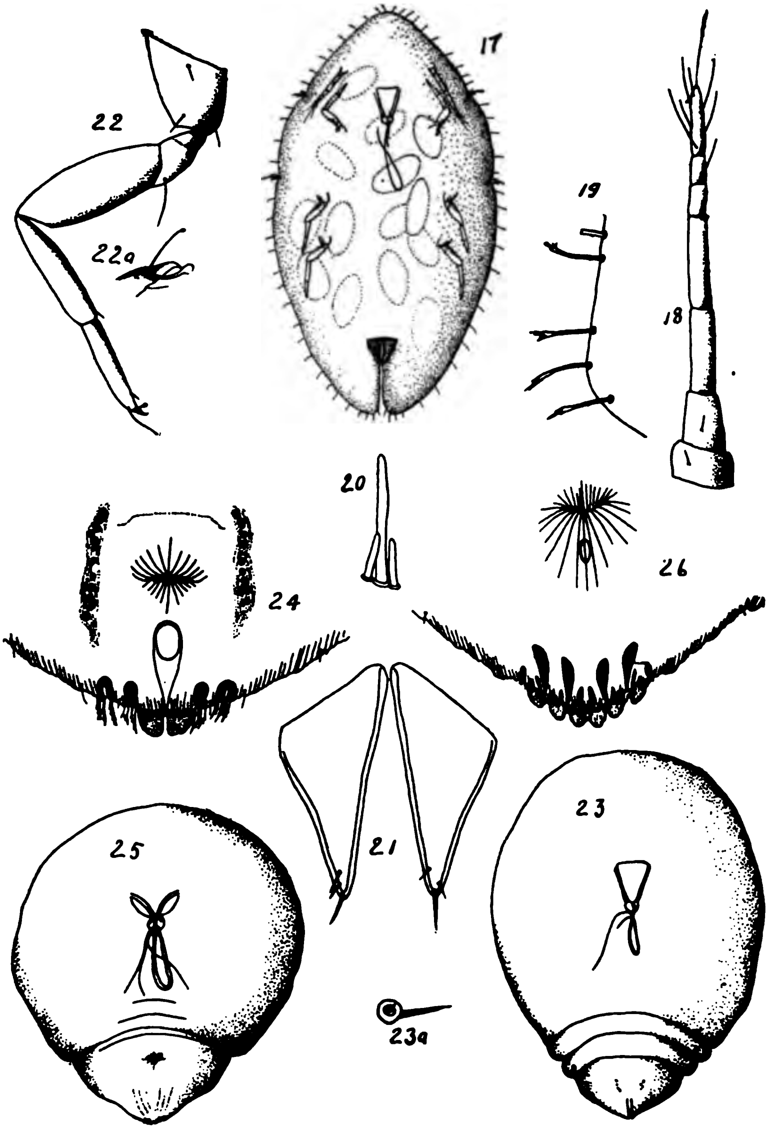


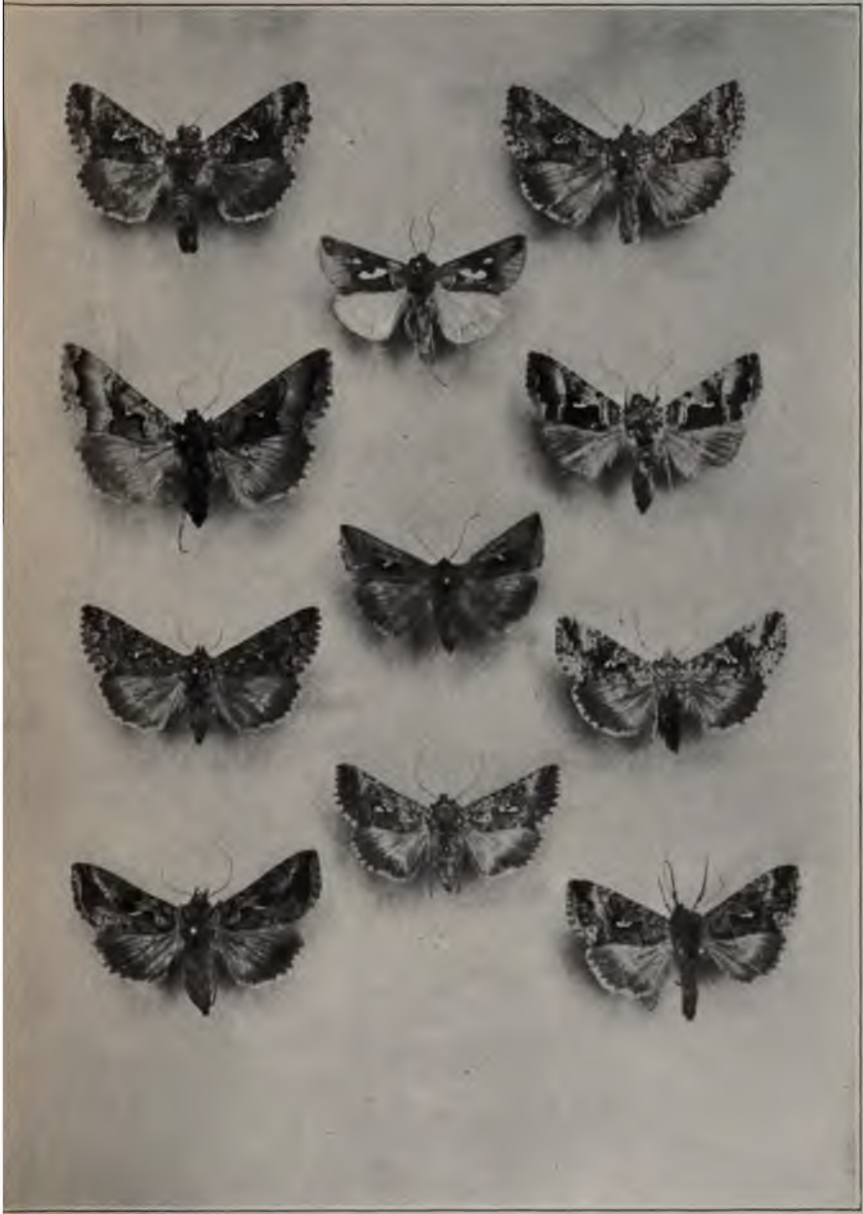
New Mallophaga.



Coccidæ from Galapagos Islands.



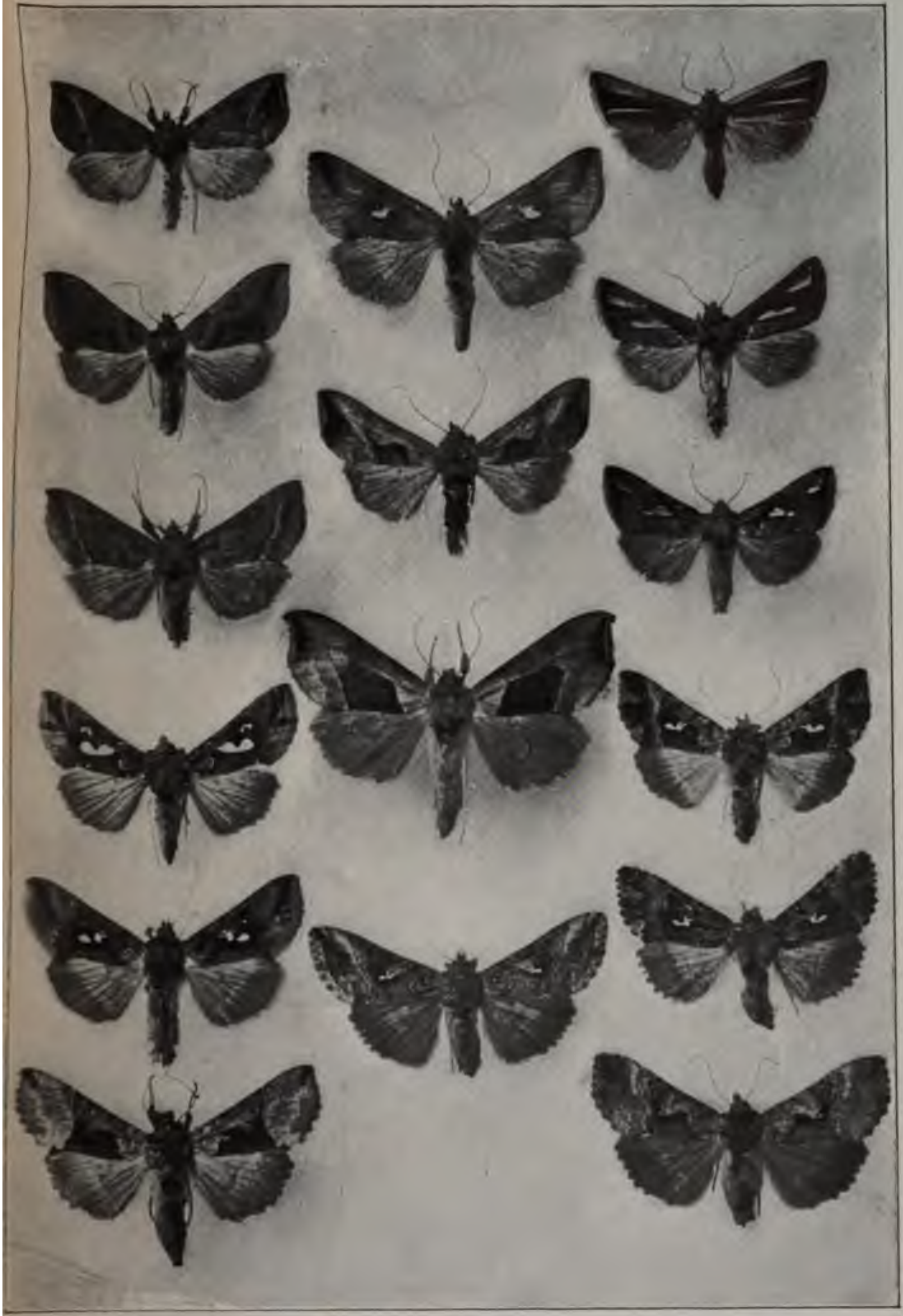
Coccidæ from Galapagos Islands.



Autographa zeta.
" *v-alba.*
" *excelsa.*
" *rubidus.*

Autographa solida.
" *simplicima.*
" *pallida.*

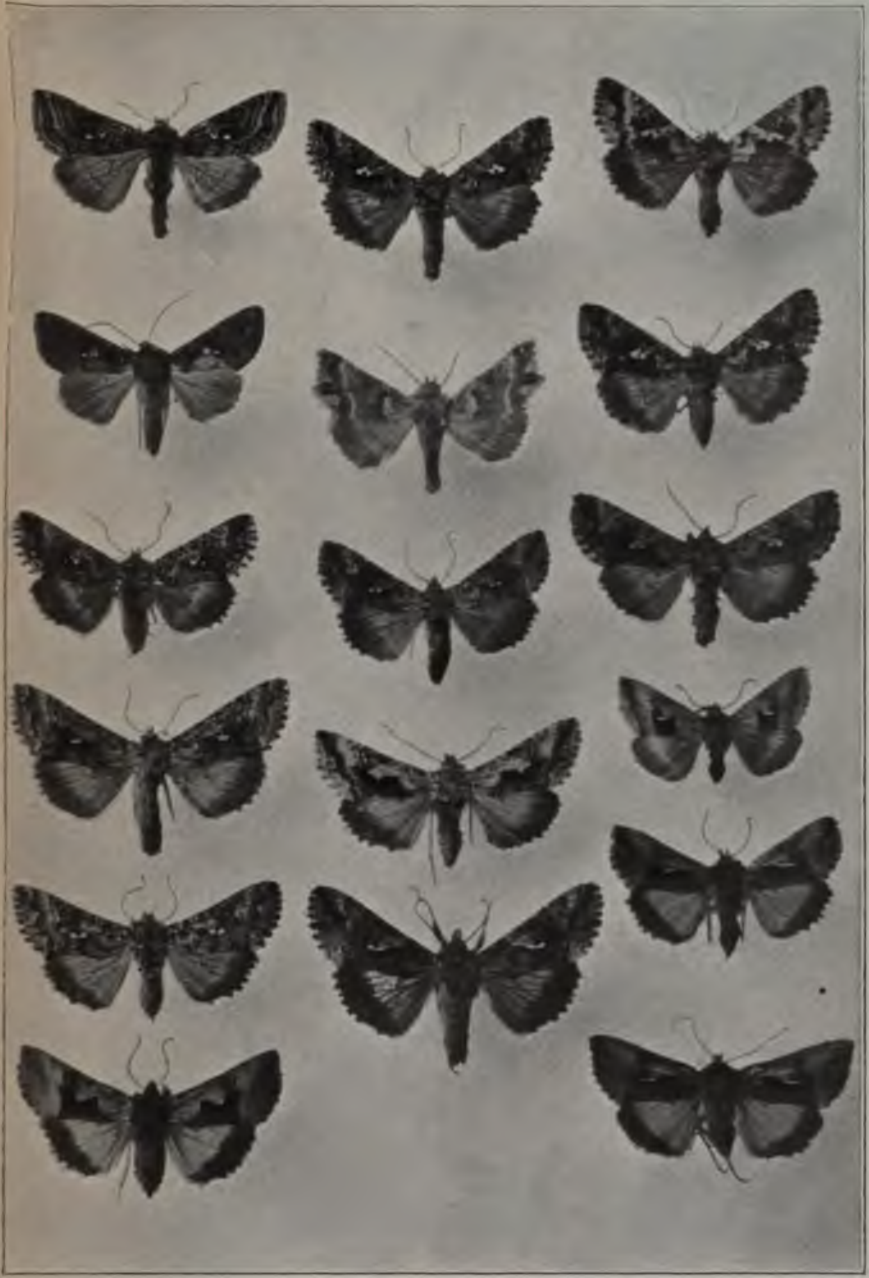
Autographa epsilon.
" *speciosa.*
" *variana.*
" *arctica.*



Panchrysia purpurigera.
Plusia ærea.
" *æreoides.*
Autographa biloba.
" *bimaculata.*
" *ampla.*

Plusia metallica.
Autographa egena.
Plusia balluca.
Autographa ou.

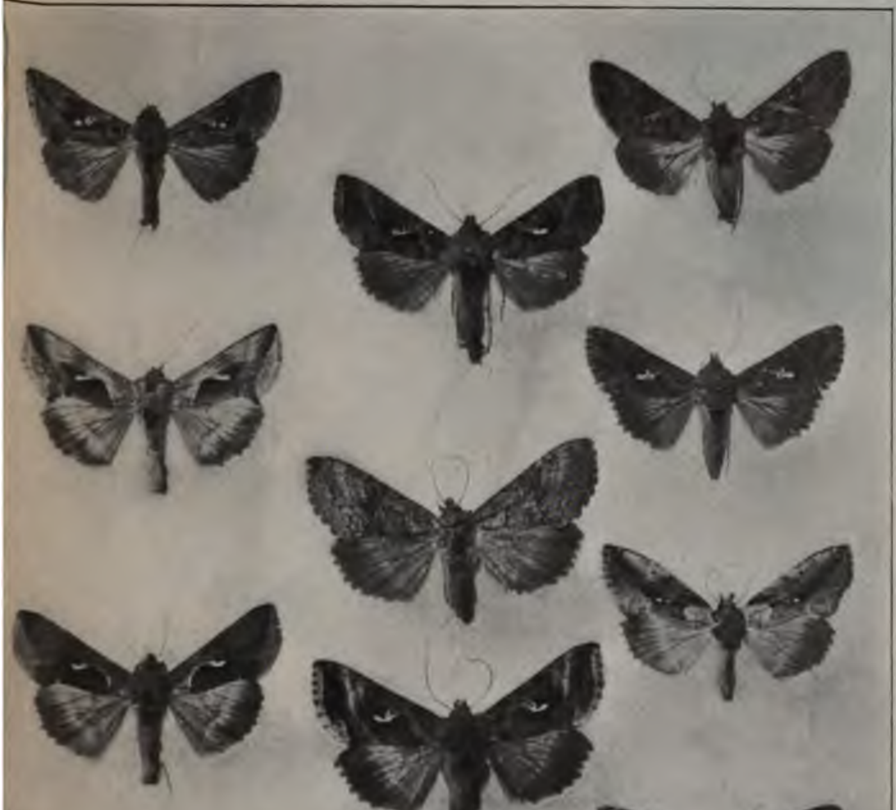
Euchalcia venusta.
" *contexta.*
" *putnami.*
Autographa labrosa.
" *corrusca.*
" *epigæa.*



Autographa mappa.
" *verruca.*
" *vaccinii.*
" *celsa.*
" *angulidens.*
" *diasema.*

Autographa alias (unsilvered).
" *albavitta.*
" *altera.*
" *surena.*
" *californica.*

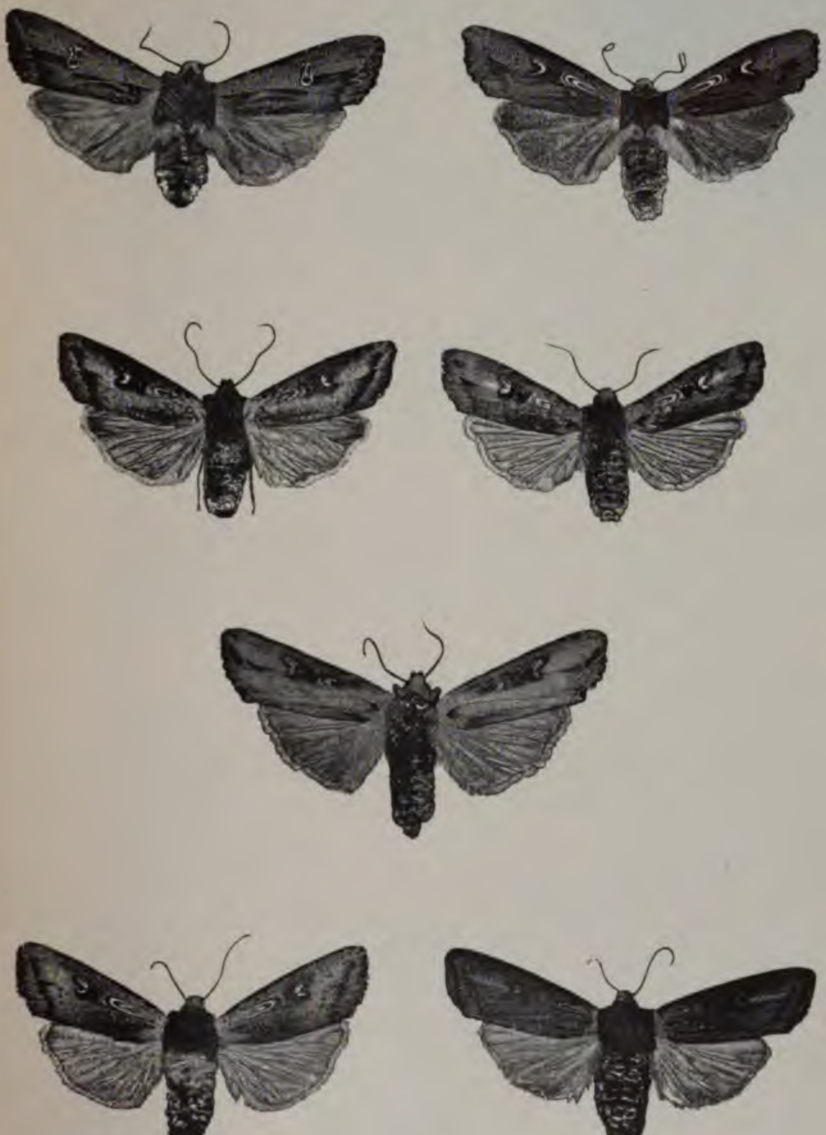
Autographa rectangula.
" *alias* (silvered).
" *ostoscripta.*
" *parilis.*
" *snowi.*
" *sackenii.*



Autographa rogationis.
" *falcifera.*
" *simplex.*
" *abrota.*
" *basigera.*

Autographa precationis.
" *selecta.*
" *pseudogamma.*
" *flagellum.*

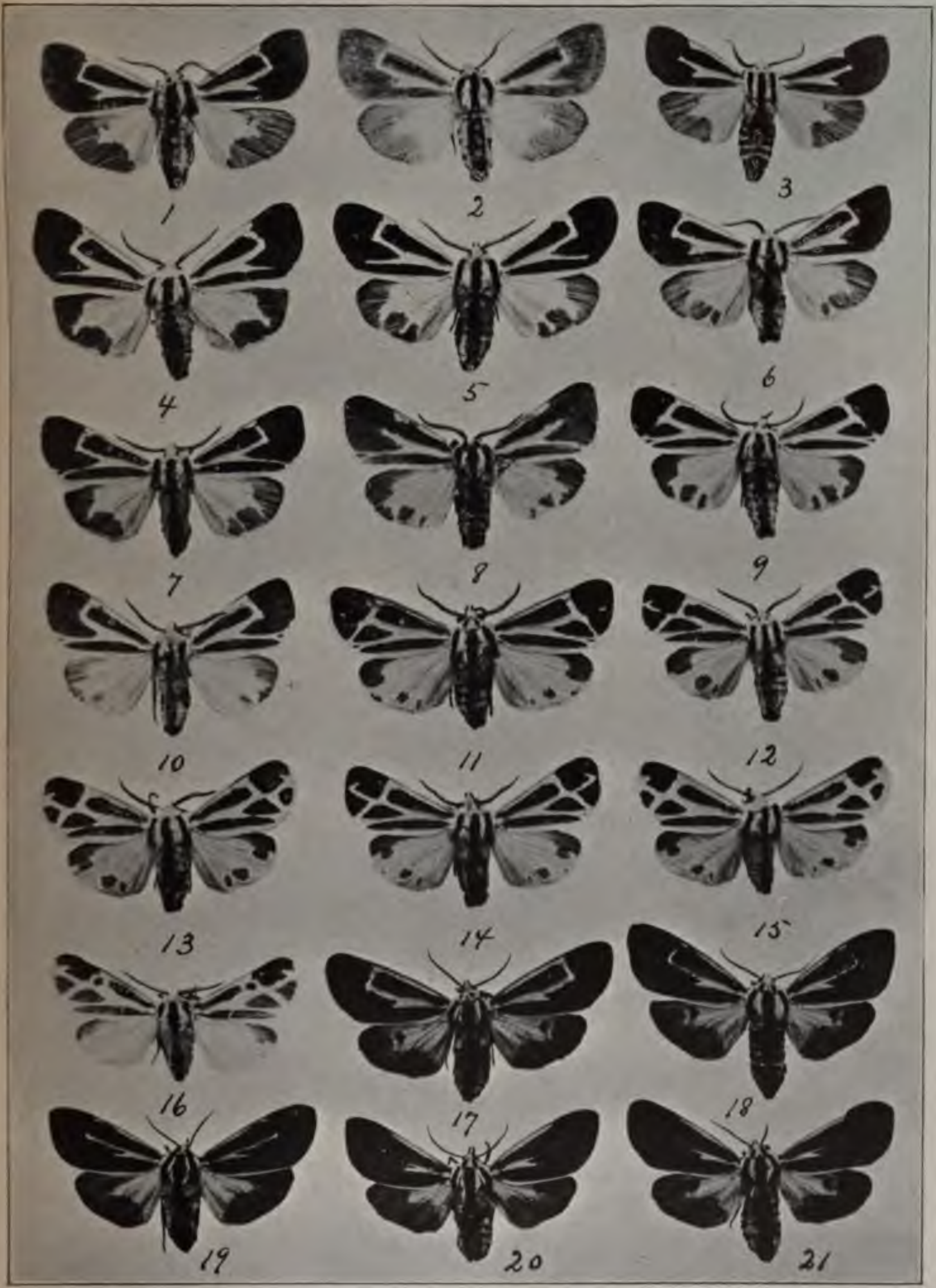
Autographa oxygramma.
" *brassicæ.*
Eusphoropteryx thyatiroides.
Polychrysia formosa.
Autographa pasiphæa.



Calocampa nupera.
" *brillians.*
" *cinerita.*

Calocampa brucei.

Calocampa curvimacula.
" *thoracica.*
" *cinerita* (dark form).



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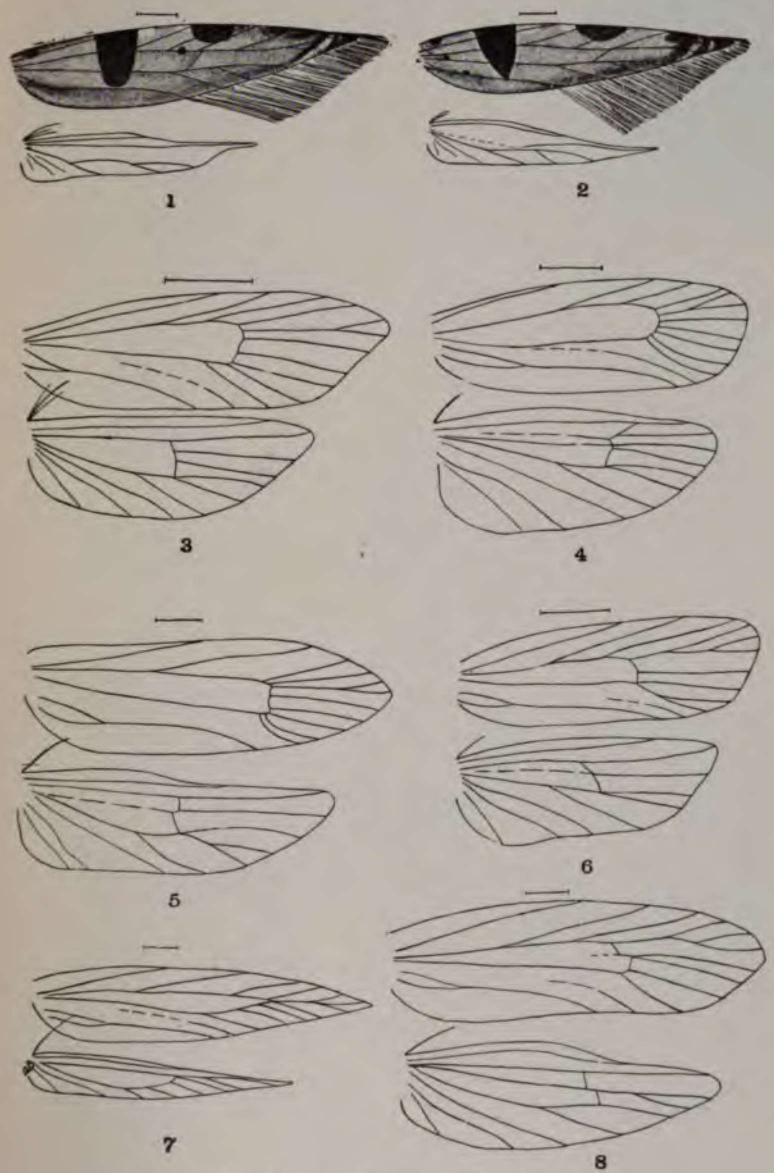
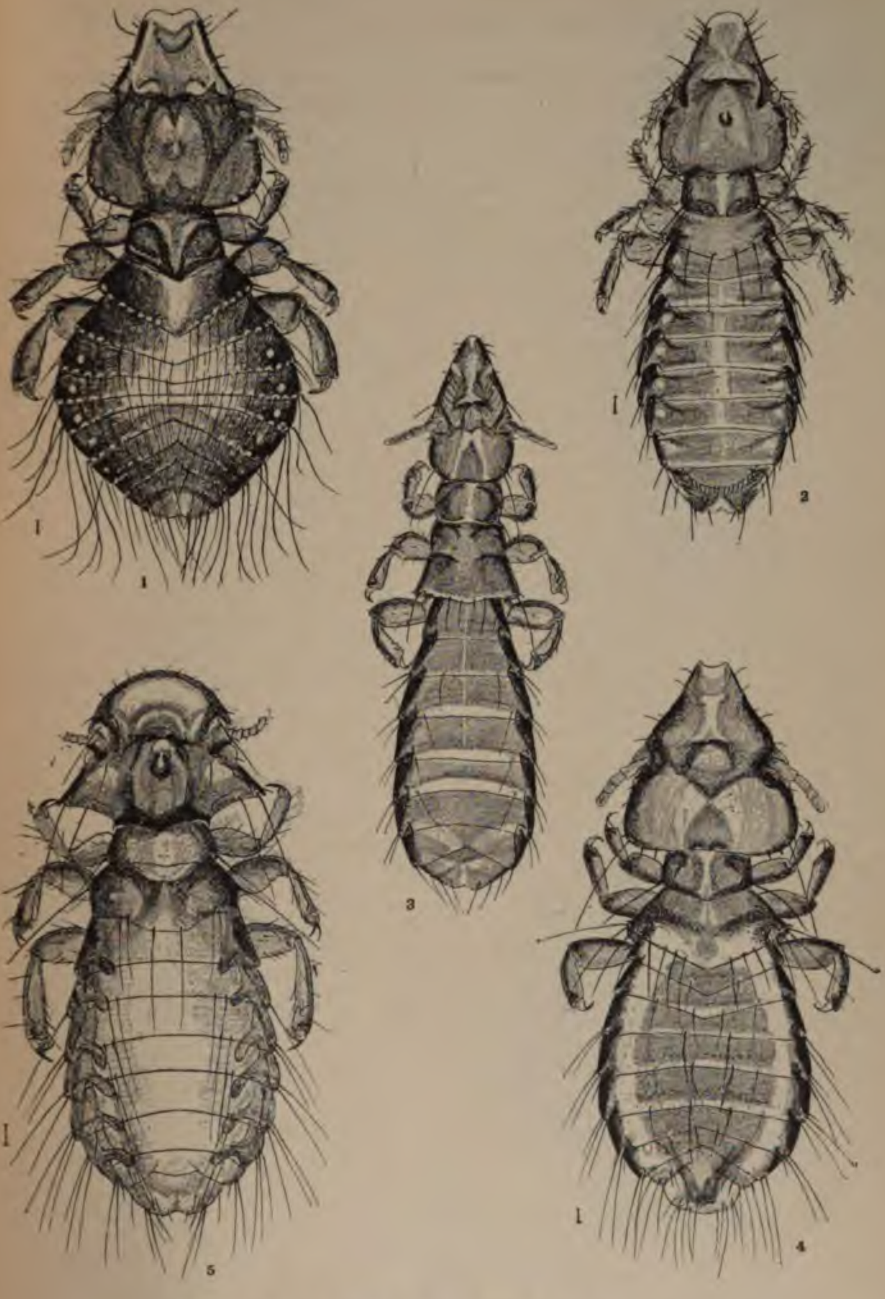
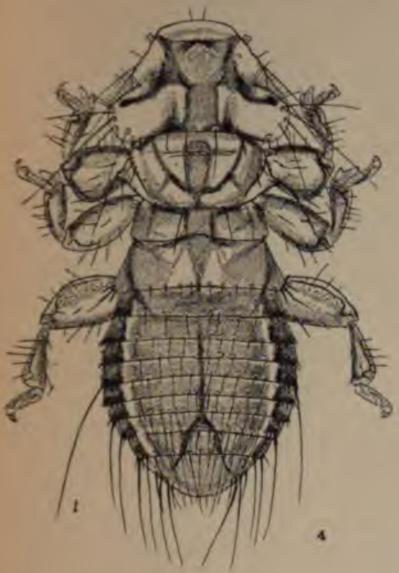


North American Tineina.



Mallophaga of the Hawaiian Islands.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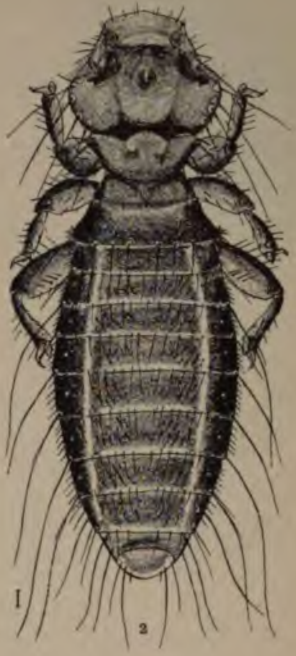
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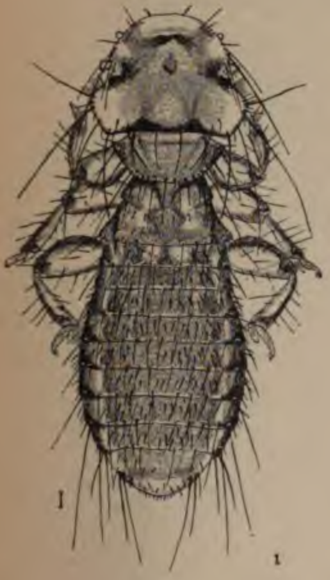
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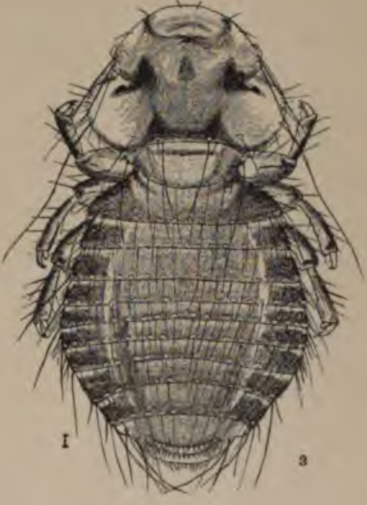
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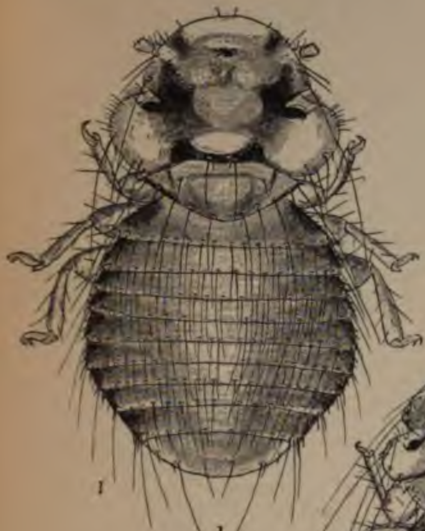

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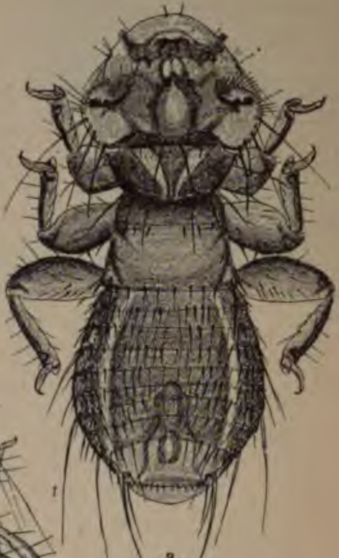

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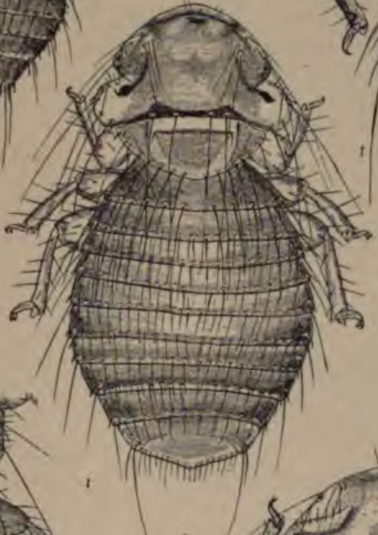

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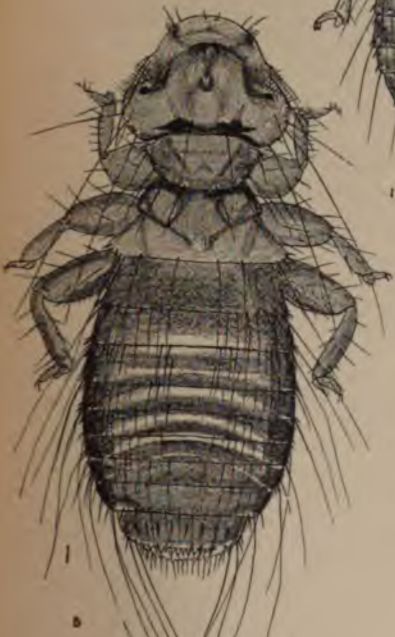

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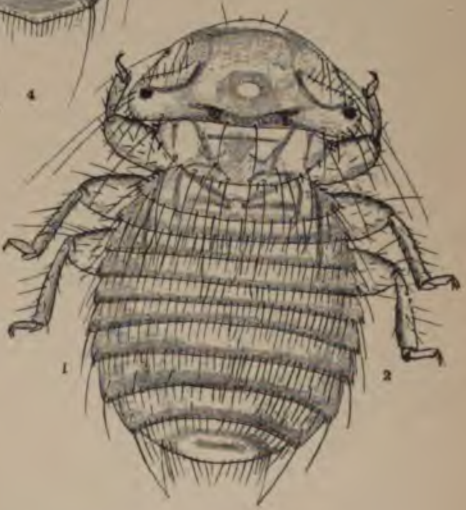

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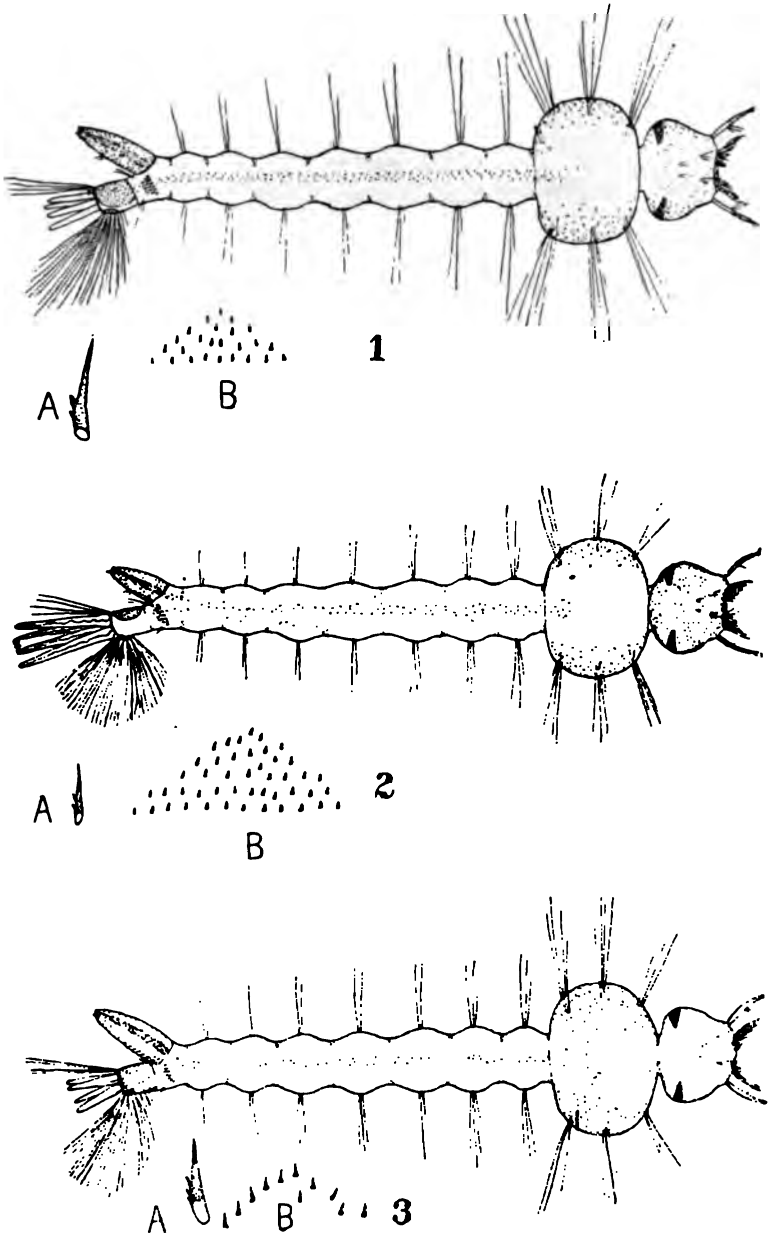
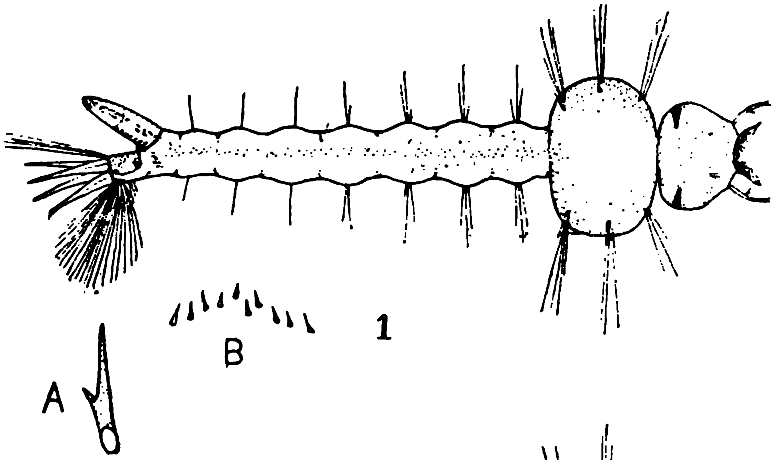
Mallophaga of the Hawaiian Islands.



1, Culex canadensis; 2, Culex atropalpus; 3, Culex sylvestris.



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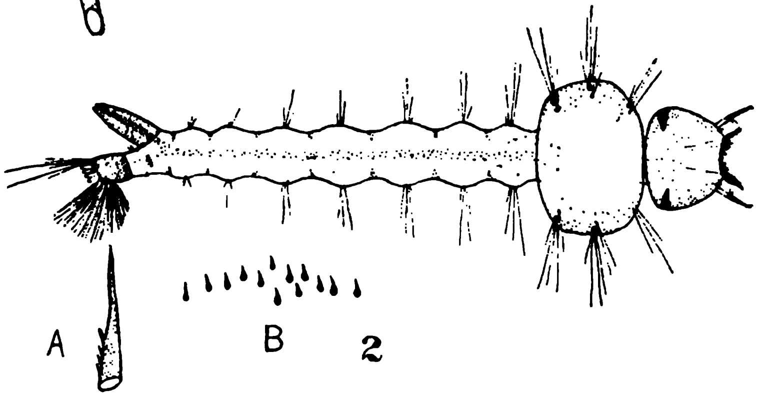

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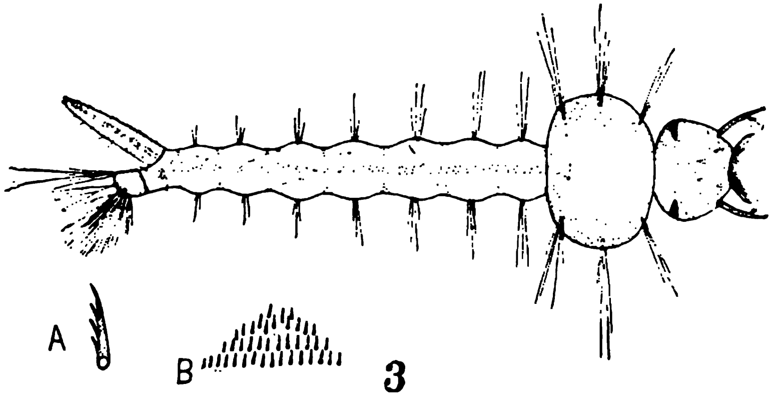

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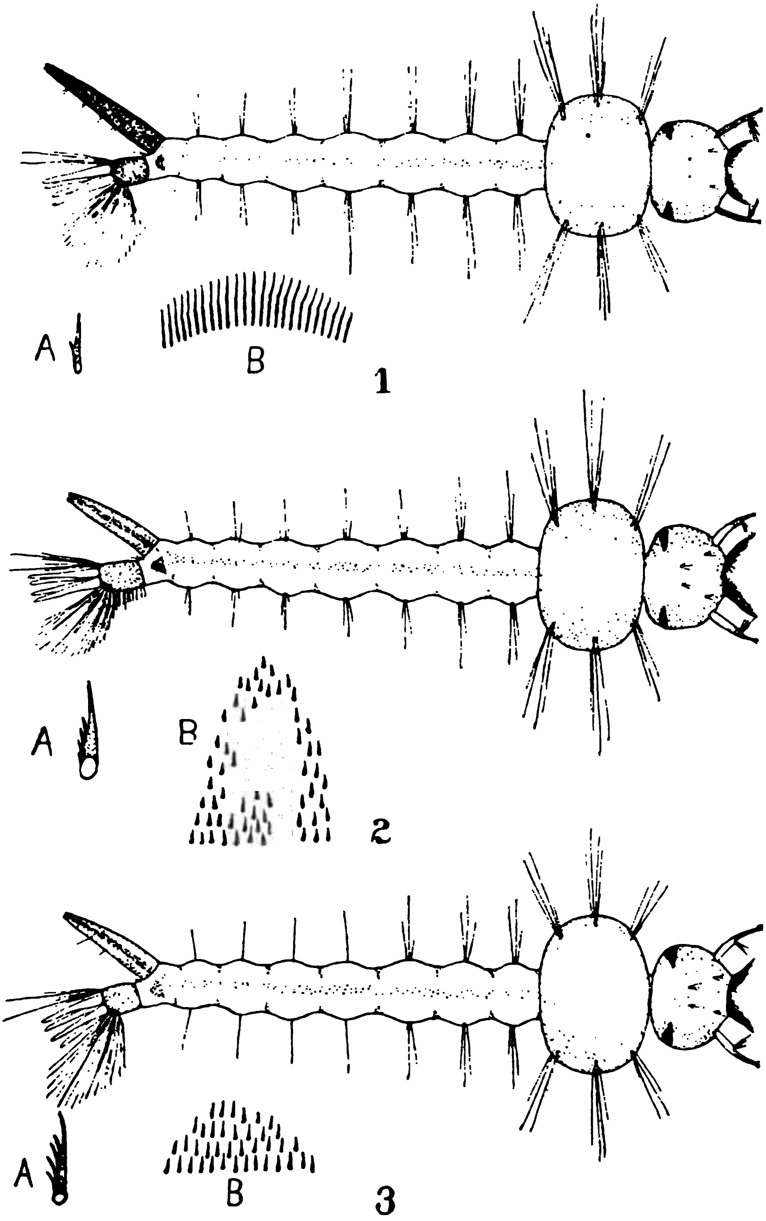
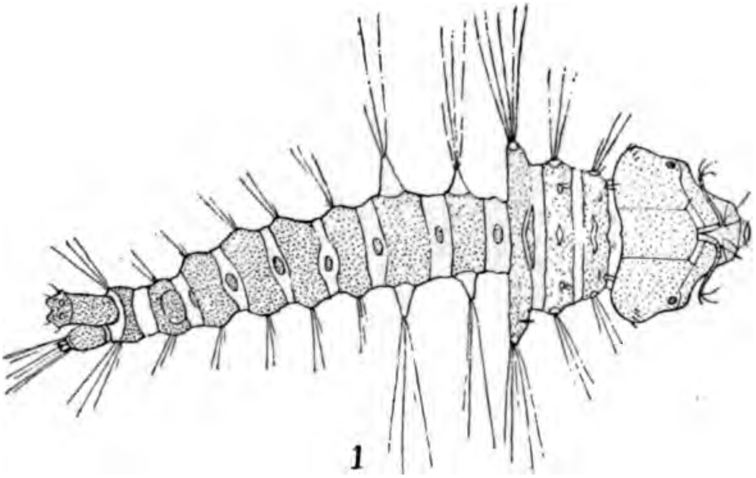
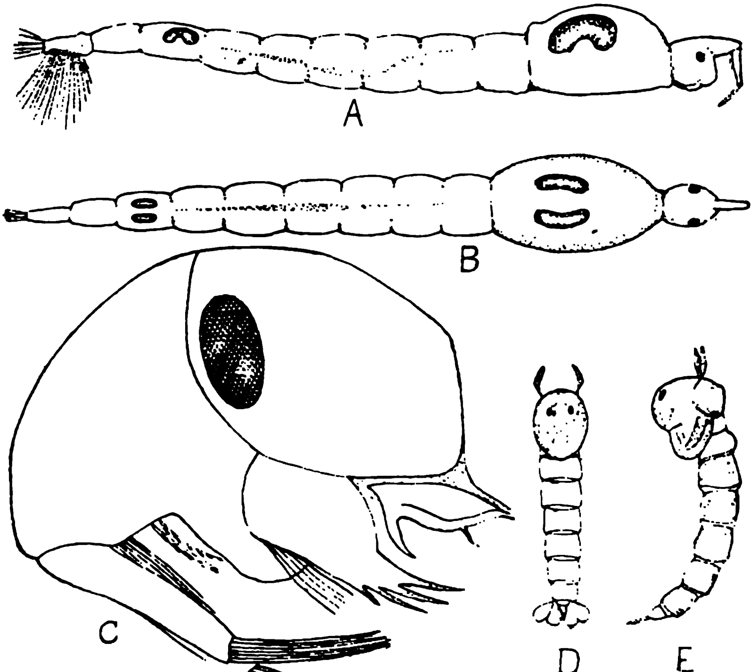
1, Aedes fuscus; 2, Culex sollicitans; 3, Culex pipiens.

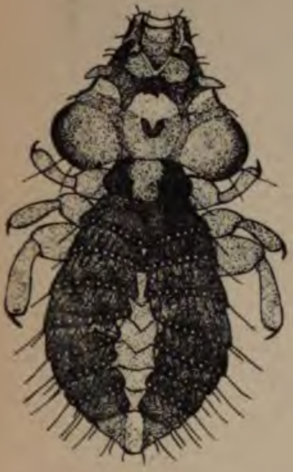


1, Culex melanurus; 2, Culex dyari; 3, Culex restuans.





1, Corethra brakeleyi; 2, Corethra trivittata.



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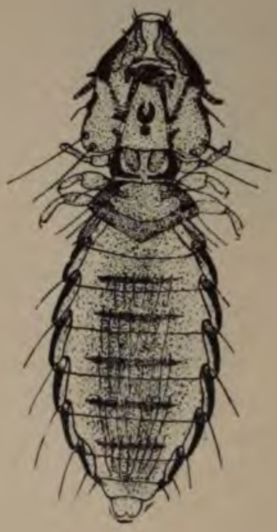

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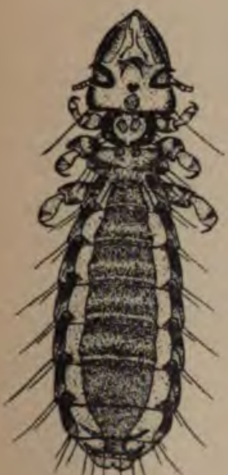

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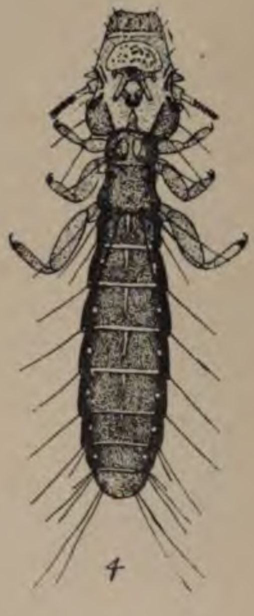

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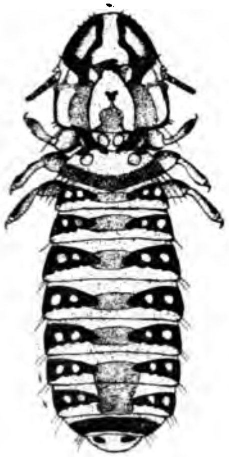
New Mallophaga.



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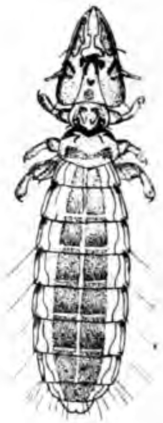

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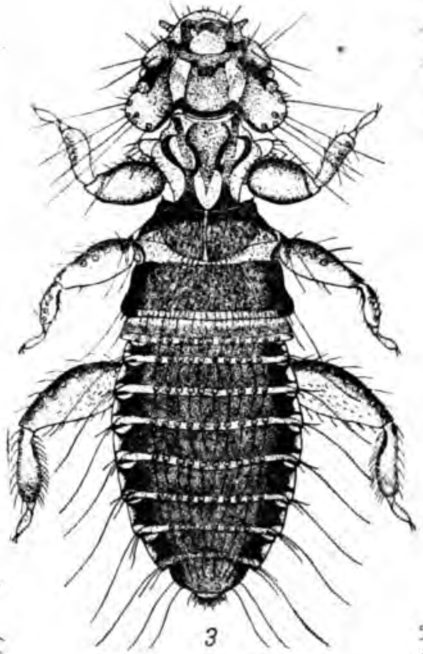

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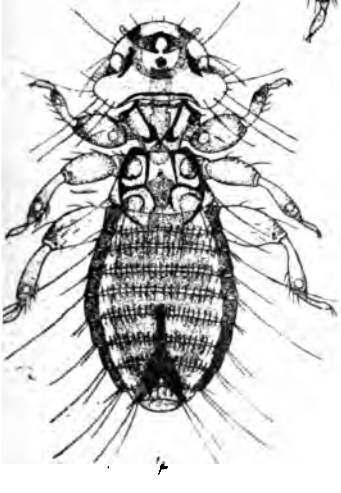

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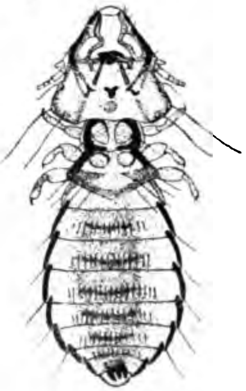

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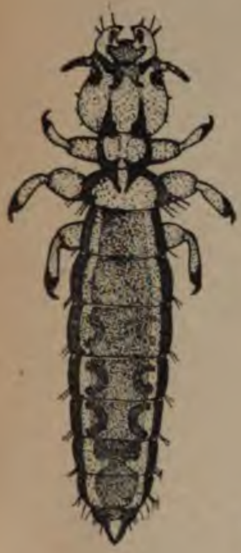
New Mallophaga.



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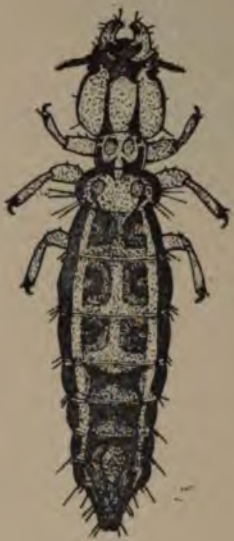

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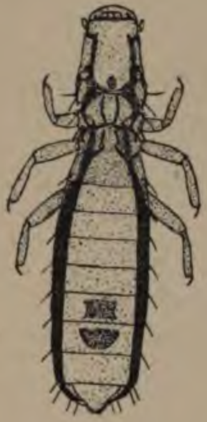

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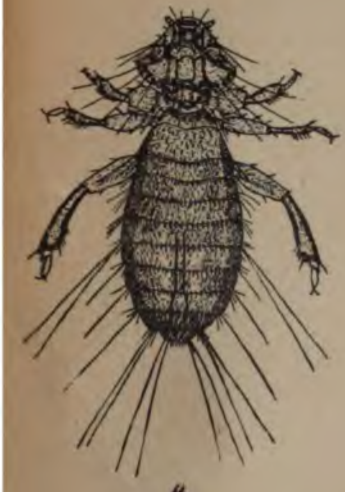

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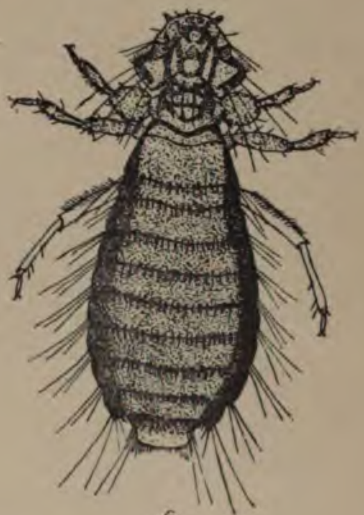

5

New Mallophaga.

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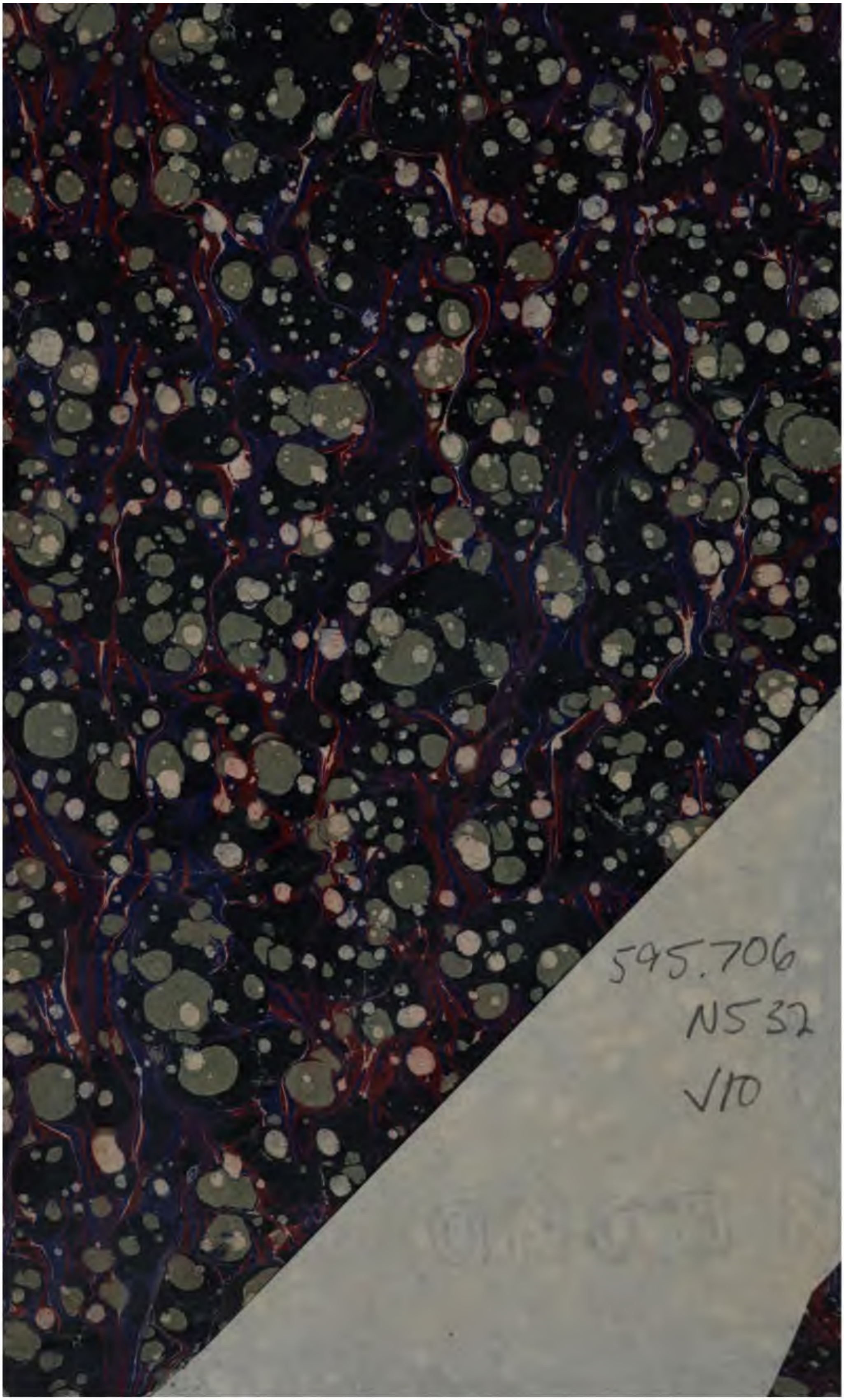

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